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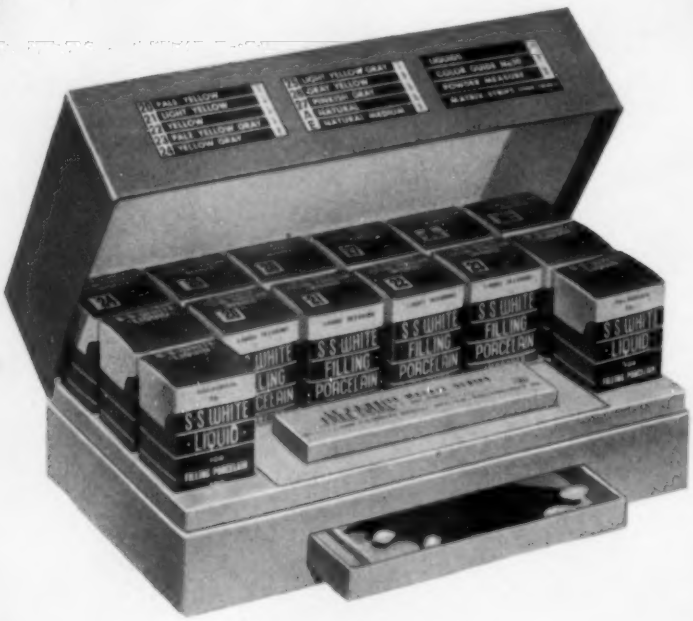

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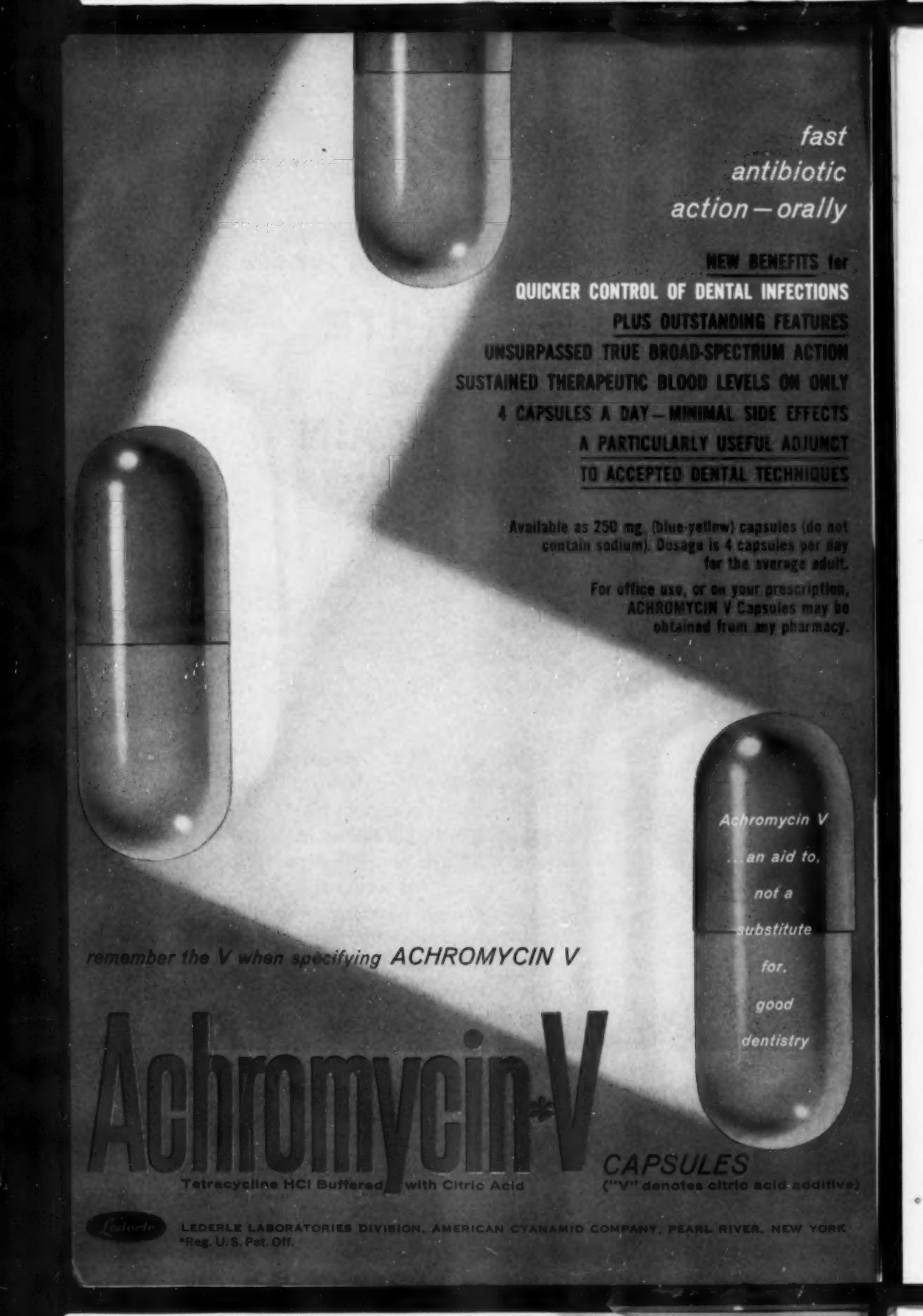
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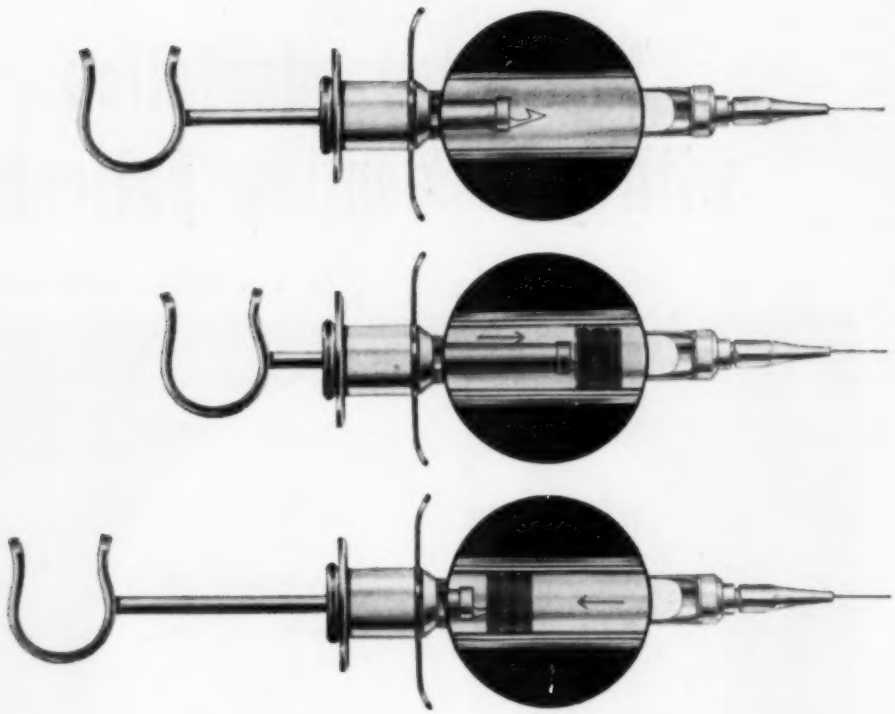

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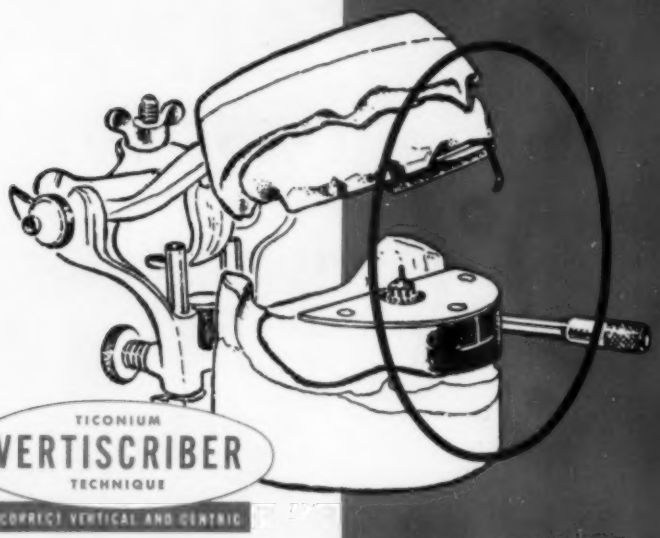

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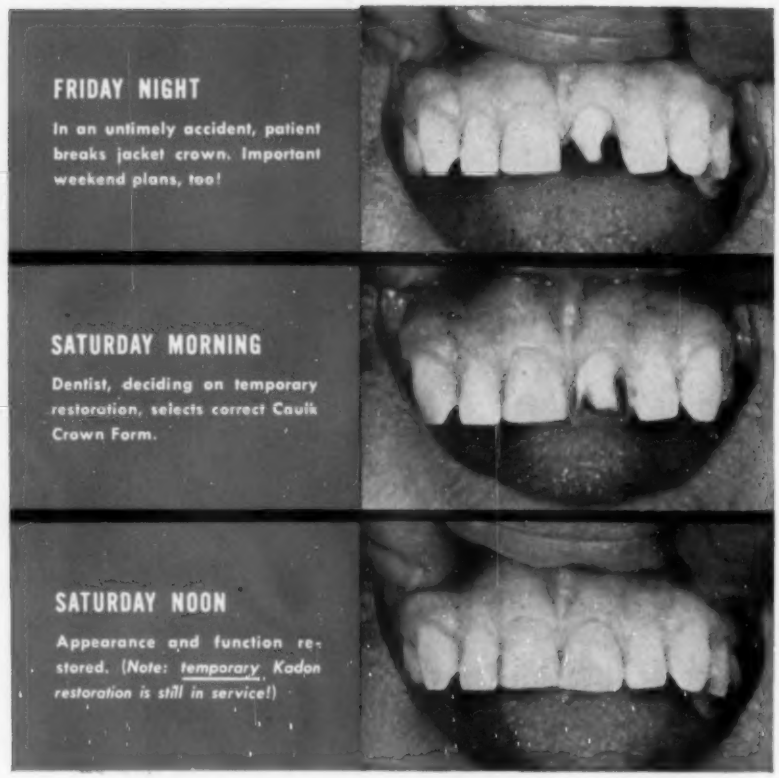
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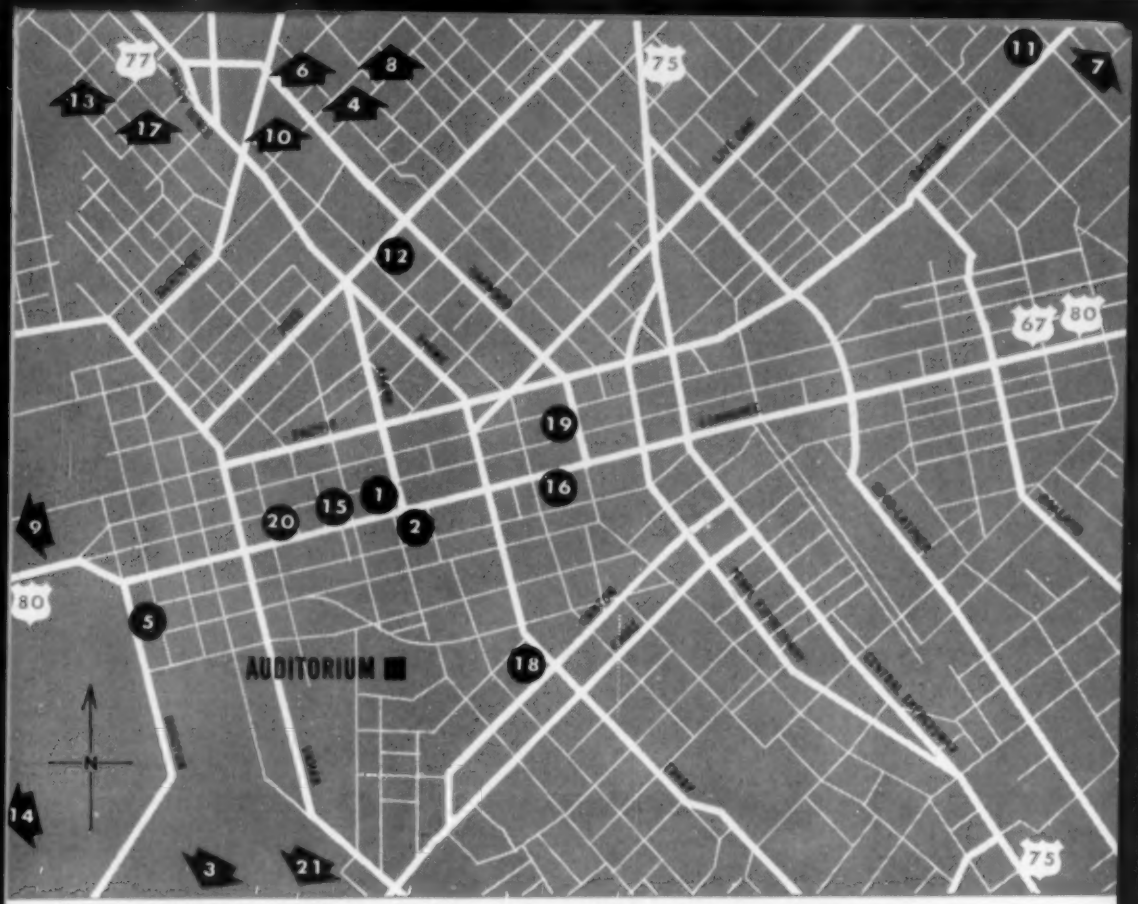

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Oaks Manor	U.S. 75 South
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Shangri-La Court	U.S. 80 West
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Texas Motel	U.S. 80 West
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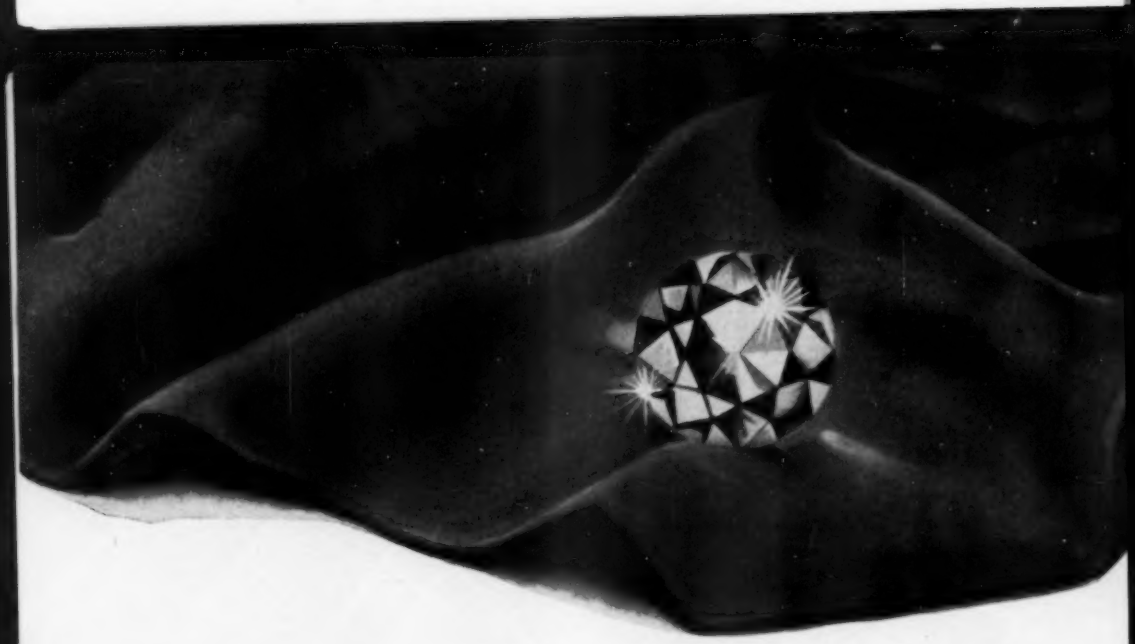

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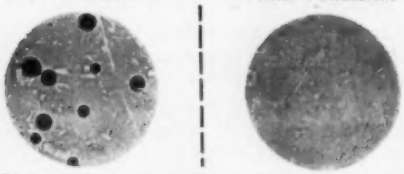

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JUNE 1958 THE Journal OF THE AMERICAN DENTAL ASSOCIATION VOLUME 56 • NUMBER 6

Dentistry in 1967: a symposium

A panel discussion on "Dentistry in 1967" was presented at the 98th annual session of the American Dental Association at Miami, Florida, on November 4, 1957.

Four officers of the Association took part in the panel moderated by the incumbent president of the Association, Harry Lyons. The participants projected the practice of dentistry ten years ahead, speculated on anticipated scientific developments, and enumerated problems likely to confront the profession in 1967.

B. Duane Moen, director of the American Dental Association Bureau of Economic Research and Statistics, discussed the explosive population trend in this country and its relationship to dental practice in the future. George C. Paffenbarger, chief of the American Dental Association research staff at the National Bureau of Standards, spoke on research developments likely to affect the practice of dentistry in the next decade. Rudolph H. Friedrich, secretary of the American Dental Association Council on Dental Health, anticipated the changes which may be expected to occur in the basic characteristics of dental practice. Shailer Peterson, secretary of the American Dental Association Council on Dental Education, reported on problems pertaining to dental education and their import on the profession and the population.

The four papers presented by the panelists and published in this issue of THE JOURNAL should be carefully read by all interested in dental health. They should be read not only because each paper is interesting reading in its own right but because, in the aggregate, they provide an intelligent perspective of the nation's dental needs, dental demands and dental services in the years that lie immediately ahead. A better understanding of what tomorrow's public will expect of the dental profession will enable the profession and each of its members to meet those expectations more effectively.

POPULATION GROWTH AND DENTAL MANPOWER

B. Duane Moen, M.A., Chicago

Making predictions of almost any kind is by nature hazardous. This fact is not generally appreciated. The weatherman is in the difficult position of having to make daily predictions which are heard by millions. Beyond that, his predictions are subject to verification or invalidation within a few hours, or in other words, within the memory span of practically everyone. The critical remarks that are current concerning the weatherman's efforts indicate that people generally do not appreciate the special difficulties associated with prediction.

Economic forecasting is one of the most perilous forms of prediction. Departments of economics in some schools have discontinued the study of long-range economic forecasting because they have been unable to develop reliable methods. Identification of the important variables influencing the economy has proved extremely challenging. It is true that many economists continue to make forecasts, particularly in the popular and semi-popular press, but in most cases it is fortunate for them that people will forget the forecasts before they are proved untrue.

POPULAR PREDICTIONS

There is only one type of predicting that has considerably more reliability than strictly economic forecasting, and that is predicting the size of the population in future years. Complete records are available of birth, death and immigration rates during past years. Trends have been carefully delineated. Population growth has been shown to be relatively stable and predictable except in periods of severe economic depression.

Before going into the specifics of anticipated population growth, the author wants to establish a concept which is extremely important in predicting the economic future of this country. We are inclined to think that population growth during a given number of years in the future will be about equal to growth during a period of similar length in the past. When the mathematics of population growth is examined it is found that population growth, in absolute numbers, is certain to be greater than in past years, except in periods of severe economic depression. Population growth works something like compound interest. It tends to be maintained at a relatively constant rate, not a constant amount.

It is for this reason that population predictions always seem surprisingly high. Population growth for the year ending at mid-1957 was 1.82 per cent, whereas in the first year of this century it was 1.96 per cent. However, in absolute numbers the growth was more than three million in the latter year compared to only 1.5 million in the earlier year. Percentage-wise, population growth does not vary greatly from year to year. However, the base to which that percentage applies is growing larger from year to year in a geometric progression, with the result that we are shocked to see the population predictions for 10 or 20 years hence.

Between 1957 and 1975 about one-nineteenth will be added to the age of this country. During that same 18 year period, at least one fourth and possibly more than one third will be added to the population of this country.[1] For the sake of discussion, a reasonable assumption appears to be that the population will increase by one third between now and 1975. In number of people this amounts to about 57 million, which is equivalent to the growth that has taken place since

Director, Bureau of Economic Research and Statistics, American Dental Association.

1. Revised projections of the population of the United States, by age and sex: 1960 to 1975, current population reports, population estimates, series P-25, no. 123, Washington, D. C., Bureau of the Census, Oct. 20, 1955.

1924. In other words, it is expected that the population growth that will occur in the next 18 years will equal that of the last 33 years.

In 1955 the Census Bureau issued four official population projections for selected years to 1975.[1] The Bureau stated: "It is felt that all four series are reasonably possible, and no series is selected at this time as most likely." The highest projection was based on the assumption that the 1954-55 birth rate would continue to 1975; the next highest on the assumption that the 1950-53 level would continue to 1975; the next highest on the assumption that the 1950-53 level would continue to 1965, then decline to about the prewar level by 1975, and the lowest projection was based on the assumption that the 1950-53 level would decline from the 1953 to about the prewar level by 1975. In all of the projections made, no improvement in mortality rates was assumed after 1960.

About two years have gone by since these official projections were issued. Population in growth during that period has actually exceeded the highest projections.[2] It is worthwhile to note that none of the four projections assumed an increase in birth rate, and that past population projections have generally been too low. This evidence appears to indicate that the higher projections are much more likely than the lower projections.

The population at mid-1957 was just over 171 million. According to the Census Bureau, by 1967 it will be somewhere between 199.9 million and 190.3 million. The four projections issued for 1975 were 228.5 million, 221.5 million, 214.6 million and 206.9 million.

In view of the fact that population growth continues to exceed the highest projection, at this time the most realistic of the four projections appears to be the high projection. In round numbers, then, we can anticipate a population of approximately 200 million in 1967 and 230 million in 1975.

AGE AND LOCATION OF THE POPULATION

The tremendous expected increases in population will not apply uniformly to all age groups. Census Bureau figures indicate that during the 12 year period ending in 1967 the number of children under ten years of age will increase about seven million or 19 per cent.[1]

The largest increase in population will come in the age group 10 to 19, which is expected to increase by about 13 million or 53 per cent. This results from the very high number of births beginning in the mid-forties.

Because of the low birth rate in the thirties, the number of persons in their thirties will actually be less in 1967 than it was in 1955.

Each age group above 40 will increase substantially in number. The total increase among persons 40 and older is expected to be about 11.5 million during the 12 years ending in 1967.

These changes in the age curve of the population will do nothing to lessen the load for dentists. The number of teeth needing fillings is higher among dental patients in the 15 to 19 age group than in any other age group.[3]

Nor is population growth going to be uniform among the several states. The Far West region, comprised of the states along the Pacific coast and Nevada, is expected to increase its population by 39 per cent in 10 years.[4] The Southwest, consisting of Texas, Oklahoma, New Mexico and Arizona, is expected to grow 22 per cent during the same period. Other regions are expected to increase their

2. Provisional estimates of the population of the United States, Jan. 1, 1950, to July 1, 1957, current population reports, population estimates, series P-25, no. 162. Washington, D. C., Bureau of the Census, Aug. 13, 1957.

3. American Dental Association, Bureau of Economic Research and Statistics. Survey of needs for dental care. Chicago, American Dental Association, 1954.

4. Illustrative projections of the population, by state, current population reports, population estimates, series P-25, no. 110. Washington, D. C., Bureau of the Census, Feb. 20, 1955.

population as follows: Southeast, 16 per cent; Central, 15 per cent; New England, 13 per cent; Northwest, 11 per cent; and Middle East, 11 per cent.

The Census Bureau points out that the population projections by state and region are not as accurate as they might be, because the migration element is based wholly on migration in the past few years. Some of the special circumstances that have obtained in past years will not be present in the future.

The male population will continue to be outnumbered by the females. Currently the ratio is about 495 males to 505 females. Consistently, more males are born than females—the ratio is 51 males to 49 females. However, at all ages the male death rate is higher.

INCREASES IN NUMBER OF DENTISTS

The Bureau of Economic Research and Statistics has made a study of the number of graduates required in future years in order to maintain the existing population-dentist ratio under each of the official population projections.[5] The number of active dentists at the present time is approximately 90,000.

The number of graduates each year through 1960 is already pretty well determined by the present dental school enrollments. The Council on Dental Education has firm figures on rates of failure among dental students, and can therefore tell with considerable accuracy the size of graduating classes through 1960. It is expected that the number of graduates will increase approximately as follows from the 3,008 graduated in 1956: 1957, 3,040 graduates; 1958, 3,140 graduates; 1959, 3,275 graduates, and 1960, 3,360 graduates.

The Council on Dental Education is also able to make an "informed guess" as to the number of dental graduates during the period 1961 through 1967. These estimates are based on knowledge of plans for new schools and plans for expansion by present schools. Obviously, such plans are subject to change which could make the following figures considerably too high or too low.

It is expected that the number of graduates will be about 3,425 in 1961; 3,490 in 1962; 3,555 in 1963; 3,620 in 1964; 3,685 in 1965; 3,750 in 1966, and 3,815 in 1967.

These are very substantial increases and on the surface might appear to be adequate to accommodate the increasing population. The Bureau's study, however, shows that the expected number of graduates will not be sufficient to maintain the existing population-dentist ratio.

In the Bureau's study, it was assumed that the death rate of dentists would be the same as the general white male population in each respective year of age. An "active dentist" was defined as a dentist under 68 years of age, since 68 is the approximate median age of retirement.

In 1960 there will be about 93,000 active dentists. In order to have the existing ratio of 1,886 as determined in the Bureau's study, there would have to be 95,100 dentists under the high population projection or 94,300 dentists under the next lower projection.

Expressed in another way, the population per dentist, found to be 1,886 in the Bureau study, in 1960 will be 1,929 under the high population projection, and 1,913 under the next lower projection.

If the rough estimates of the number of graduates during 1961-1967 prove to be correct, there will be approximately 100,300 dentists in the United States in 1967. In order to have a ratio of 1,886 persons per dentist, this number would have to be 106,000 under the high projection or 103,900 under the next lower projection.

According to the Census Bureau, dur-

5. American Dental Association, Bureau of Economic Research and Statistics. Number of dental graduates required in future years. Chicago, American Dental Association, April, 1956.

ing the year ending in mid-1957 the population increased 3,055,000. The net gain in active dentists was 1,165. Thus, one new dentist was added for each 2,620 persons added to the population. To maintain the existing ratio it would have been necessary to add one new dentist for each 1,886 persons added to the population. In other words, it would have been necessary to graduate an additional 455 dentists, which would provide for a net gain of 1,620 dentists rather than 1,165 dentists.

During the year ending at mid-1958 there will be a considerable increase in the number of dentists reaching retirement age, with the result that the net gain in number of active dentists will be reduced to 1,020. During the current year, then, the deficit in number of graduates required to maintain the ratio of 1,886 will be 600, assuming a population increase equal to that of the preceding year.

Since the number of graduates through 1960 is already fixed, it is of interest to study the number of graduates required in years after 1960 in order to restore the population-dentist ratio to 1,886 by 1975. Under the highest population projection (228.5 million persons in 1975,) it would be necessary to increase the number of graduates by 125 each year after 1960 to achieve a ratio of 1,886 by 1975. Under the next highest projection (221.5 million in 1975,) an annual increase of 94 would be needed. Under the third highest (214.6 million in 1975,) an annual increase of 63 would be required. It would appear, therefore, that to restore the present ratio in 1975, it will be necessary to create more than two new schools per year, or the equivalent in expansion of present schools. If this seems like an excessive increase in the number of schools, it is because of the "geometric progression"—the law of population growth. It is just not realistic to expect that the amount of expansion required in the future will be no greater than the amount required in the past.

AUXILIARY PERSONNEL

A phenomenal growth has occurred during the last ten years in the number of dental hygiene schools. In 1946, there were 14 schools graduating 399 dental hygienists. In 1956, 31 schools graduated 890 hygienists. The increase will continue and it is expected that in 1961 there will be 39 schools graduating 1,300 dental hygienists. Currently the number of dental hygienists is believed to be less than 9,000. The number has not increased much in recent years despite the greatly accelerated rate of graduation, because most dental hygienists do not remain long in the profession. Surveys by the Bureau have shown that the number of hygienists employed full time by dentists has increased from 4,900 in 1952 to 6,700 in 1955.

In 1952 the number of full-time dental assistants was about 45,000 and the number of secretaries and receptionists was 11,600, for a total of 56,600. The latest survey indicates 62,000 dental assistants and 10,900 secretaries and receptionists in 1955, for a total of 72,900. This increase of 16,300 or 29 per cent in only three years helps to account for the increase in number of patients reported by the dentist.

The number of dental technicians employed in dentists' offices has been declining somewhat. The three surveys have shown that dentists employed 3,300 technicians in 1949, 3,000 in 1952 and 2,900 in 1955. Currently there are between 20,000 and 25,000 technicians employed by commercial prosthetic dental laboratories.

DEMAND FOR DENTAL CARE

Surveys conducted by the American Dental Association have shown that the mean number of patients of dentists has increased from 933 in 1949 to 1,012 in 1952 and to 1,056 in 1955. From these figures and the number of practicing dentists it is estimated that the percentage of the

population seeing a dentist during the year has risen from 40 per cent in 1949 to 42 per cent in 1952 and 45 per cent in 1955.

It is safe to assume that this percentage will continue to increase except in times of economic depression. If the increase continues at the same rate, about 55 per cent of the population will see the dentist in 1967. Combining the increase in population with the increase in percentage of the population seeing the dentist, it appears that about 110 million persons will see the dentist in 1967 compared to less than 75 million in 1955.

It is clear that the supply of dentists in relation to the size of the population has been decreasing. At the same time the public's demand for dental care has been increasing. It might seem that the combination of these two trends would mean that dentists are falling behind in their ability to meet the demands for dental care.

Surveys conducted by the Association have shown that dentists are maintaining, or even improving to a small extent, their ability to meet the demand for dental care. In the last two surveys of dental practice, conducted in 1953 and 1956, dentists were asked to record the average length of wait for the initial appointment of a series of appointments. During the three-year period there was a reduction in waiting time from 13.6 days to 12.8 days.[6]

In the two surveys dentists were also asked to check one of four statements describing different degrees of busyness. The percentage of dentists reporting too few patients increased slightly during the three-year period.

It seems quite obvious that the increased productivity per dentist was made possible to a large extent by the employment of additional auxiliary personnel.

In summary I should like to make the following general points:

1. Population growth in the future is certain to be much greater than in the past.

2. The unprecedented population growth will require unprecedented production, including production of dental services.

3. It appears highly unlikely that the number of dental graduates will be sufficient to offset losses owing to death and retirement and to maintain the present population-dentist ratio.

4. In the recent past, dentists have been successful in keeping ahead of demand for dental care despite a decreasing supply of dentists and increasing demand for care.

5. Dentists will probably continue to meet the rapidly increasing demands for dental care partly by hiring additional auxiliary personnel and expanding their offices.

6. American Dental Association, Bureau of Economic Research and Statistics. The 1956 survey of dental practice. Chicago, American Dental Association.

SCIENTIFIC DEVELOPMENT AND METHODS IN PRACTICE

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The following forecasting of scientific development is based on the general knowledge presently available. New developments in basic science yet unthought of may change drastically the practice of dentistry. No one knows. The predictions that follow go far beyond the authors' work for the American Dental Association at the National Bureau of Standards. The whole discussion should be evaluated with that thought in mind.

DENTISTRY'S RESPONSIBILITY

When one ventures to predict the scientific development and the methods of practice of dentistry during the next decade, 1957-1966, one should first consider what the public responsibilities of dentistry now are and what changes in these responsibilities may be envisioned. The primary concern of dentistry today is the prevention of dental caries, periodontal diseases and malformations, and the treatment of their sequelae. Nothing on the horizon today suggests any major changes in the foregoing commitments.

PREVENTION

Fluoride Therapy • The finding of dental research that a trace element, fluorine, in proper amounts in the diet can influence the development of a body organ to make it disease-resistant is an unparalleled achievement in disease prevention. The evidence has continued to mount that fluorine affords a significant protection against dental caries without a detrimental effect on the body.

The percentage of the population (having a common water supply) who will be protected with the fluoridation program will continue to increase. That proportion of the very young children without benefit of a common water supply should have, and to a greater extent will have, systemic fluoride therapy prescribed by the family dentist. For those children who are too old for systemic treatment, topical treatment with fluorides, and perhaps other anticariogenic agents, will increase.

Remineralization • There is excellent evidence that enamel is severely attacked before a cavity can be seen. There is also substantial proof that such damaged enamel may be at least partially repaired. Possibly some enamel is not fully matured or is incompletely mineralized. The routine surface treatment of the teeth of young patients with remineralization agents or synthetic impregnating or coating materials may easily become a routine procedure within the next few years. This, like fluoride therapy, is a trend which shows the ever-increasing role of oral medicine in dentistry.

Nutrition and Diet • The analysis of diets of dental patients will increase in the next few years. The amount of increase will depend largely on new basic knowledge that is developed.

The effective control of rampant caries with a restricted carbohydrate (principally restriction of sugar) intake has been demonstrated repeatedly. The effect of such restriction should be checked with the lactobacilli count. These procedures will become an increasing part of dental practice.

Certainly a basic understanding of the process called nutrition is imperative in the practice of modern dentistry and will receive more attention in the future than it does at present.

Slight malnutrition is difficult to diag-

Research associates, American Dental Association, National Bureau of Standards.

nose; however, it may become accepted practice to prescribe vitamin C for patients undergoing oral surgery if they have a history of delayed wound healing. It may also be found expedient to prescribe vitamin B complex for those patients whose soft tissues do not maintain a healthy reaction to the normal stresses exerted by prosthetic appliances.

No data appear to be available, with the possible exception of those data dealing with protein insufficiency, that definite nutritional deficiencies are widespread in the adult population of this country. Therefore the indiscriminate prescribing of vitamins, minerals or other dietary supplements is certainly not justified now nor does there seem to be any trace of evidence that such prescribing will come in the near future. This applies to both caries and periodontal diseases. In fact, the relationship between periodontal diseases and malnutrition is not established generally. The association between scurvy and ascorbic acid (vitamin C) deficiency, and between nicotinic acid (niacin) deficiency and pellagra is well known. These dietary diseases in the beginning stages have been demonstrated comparatively rarely. There is no reason to believe on the basis of the present evidence that scurvy or pellagra will increase: they should decrease.

Antibiotics and Antienzymes • The prophylactic use of antibiotics in oral surgery on patients with valvular heart disease or with a past history of rheumatic fever will increase. There will also be an increase in the antibiotic therapy of acute and chronic dental or oral infections.

Antienzymes have had a rather dismal dental history of late. They do, however, afford an excellent approach to prevention of caries and possibly many types of periodontal lesions. There is a strong possibility that they may be developed as effective anticariogenic agents which will prevent the bacteria from forming noxious products.

Oral Hygiene • Unless the bacteria have suitable food they cannot prosper. There is no substitute for good oral hygiene in preventing dental disease. Just try brushing half of your mouth and neglect the other half for a few weeks and then notice the difference. More time will be taken by the dentist than he now takes to explain the necessity for and the methods of good home care of the mouth.

Operative Dentistry • Operative dentistry is usually considered primarily as a reparative health service. Nothing could be farther from the truth because operative dentistry, which some call "plugging the teeth" in a disparaging manner, is dentistry's foremost preventive measure. This is illustrated by a study of 13 year old children of Oslo, Norway, where a school dental program had been in effect since 1910. These Norwegian children had lost only six permanent teeth in each 100 children.

Compare this loss with the loss of 100 teeth per 100 children 13 years of age in Richmond, Ind. The caries rate was about nine teeth per child in both Oslo and Richmond. However, there were eight and a half fillings per child in Oslo and only one half filling per child in Richmond. Operative dentistry in all probability made the difference and that is where the emphasis should be, and let us hope that it will be, during the next ten years.

MEANS OF TREATMENT AVAILABLE

Throughout all trades, businesses and professions there usually is a great lag between the discovery and application of knowledge. There is no doubt that at the present time the loss of teeth from caries almost could be eliminated by the extant preventive measures. With an adequate program of operative dentistry for children, with fluorine therapy in its various phases and with dietary control in some instances, the loss of teeth from

caries could be made almost negligible. In the next ten years prevention will become one of the keynotes of general dental practice.

DIAGNOSIS

Tests for Susceptibility to Caries • There is a paucity of data indicating that laboratory tests on saliva would yield useful information in diagnosis of a tendency to early caries and periodontal diseases. As yet no well-defined relationship has been established between the main dental diseases and the volume of saliva, its consistency, its inorganic components, its buffering capacity and pH, and its antibacterial and antienzyme actions.

The lactobacilli count of saliva by precise cultural methods has been used as a crude index of caries activity. It is a useful test in dietary control and should find increasing use in dental practice.

X-ray • The gathering knowledge of the biological effects of radiation is being felt in dentistry and in the next ten years diagnosis by x-ray may lessen somewhat. At the same time the radiation to which the patient is exposed in diagnostic procedures will be reduced to a small part of the present amount by the use of very fast films, higher kilovoltages, better collimation, filtration and timers. Much of the x-ray equipment in service is obsolete and should be replaced within the next ten years.

The special technics which show in detail images of structures lying in a predetermined plane of tissue, while blurring or eliminating structures in other planes, will find increasing use in dental x-ray examination. Such technics called by a variety of names (tomography, laminagraphy, planigraphy, and panoramic x-ray) are being perfected. The first use will probably be in military and public health dentistry, but they will inevitably find their way into private dental practice.

Transillumination • The pathologic condition of the crowns of the anterior teeth is as readily detected by transillumination as with the roentgen ray. It is a useful diagnostic method that needs reemphasis.

Pulp Pathology • The best means available today to determine vitality of the pulp include thermal and electrical shock, percussion, and change in opacity and color. No initial development of diagnostic instrumentation seems likely to displace these present methods. Perhaps some instrument based on sonic, fluorescent, electrical, mechanical or chemical tests will be evolved to help the dentist diagnose pulp conditions better than is now done.

TREATMENT

Caries • The only way to treat a carious lesion is to excise it and prepare the tooth for a filling. The preparation of the cavity is the main reason that people do not seek needed dental service in time. The fear of what they call the dental drill is far greater than the desire to preserve their teeth. Therefore the evolvement of improved methods for removing enamel and dentin will go a long way in encouraging people to seek dental service.

The air abrasive, the ultrasonic devices, the water and air turbine driven handpieces and high speed mechanically driven handpieces point the way to circumvent the obnoxiousness of removing enamel with the comparatively slow running steel bur and mounted stones.

The air abrasive has not found wide acceptance because a cavity cannot be shaped with it nearly as easily as with rotating cutting and grinding instruments and because the technic of using the air abrasive is so different from the conventional methods of cavity preparation. The same holds true for the ultrasonic devices. It is predicted that they, like the air abrasive, will not receive wide acceptance in

dentistry. Both will cut enamel readily without vibration and so have a very high patient acceptance. However, they cannot compete with rotary instruments in cutting the hard tooth tissues.

The water and air turbine handpieces will probably dominate the field in high speed handpieces. The mechanically driven high speed handpieces are powered with a belt drive. This assembly is awkward compared with a turbine handpiece on the end of a tube. Also cooling and lubrication are no problem with the turbine driven handpieces, which in addition have only one moving part, the rotor. The turbine handpieces will require less servicing than mechanical handpieces and can be sterilized by boiling in water. Within the next ten years the turbine handpieces will be mounted in the instrument panel of the dental unit along with improved aspirators and devices to supply warm water and air to the cavity during cutting. Thus, the design of the dental unit will change to make dental surgery more acceptable to the patient and far less fatiguing to the dentist.

PERIODONTAL DISEASES

Treatment • The conservative treatment, which consists of the periodic removal of calculus and debris, the elimination of food impactions, traumatic occlusion, and faulty restorations, combined with a good home oral hygiene program, will continue to predominate over the surgical and splinting technics which will be used when the condition is more advanced. However, surgery will be used more and more for the proper contouring of the gums and bone. Of course the diseases caused by bacteria, viruses and drugs, and by systemic disturbances such as leukemia and hormonal imbalance will receive the same therapy now practiced unless newer knowledge is developed rapidly. Unfortunately there are few straws in the wind which point to any significant advances in the treatment of periodontal diseases.

FILLING MATERIALS

Evaluation • In addition to the classical criteria used for evaluating filling materials, namely mechanical properties, resistance to corrosion, low solubility, dimensional stability, esthetics and tissue tolerance, there probably will be added two others: first, the ability of the filling material to stimulate the formation of secondary dentin and second, the degree of anticariogenic action of the material.

Amalgam which has been the dominant filling material for years is going to be challenged by gallium-based alloys. In fact, if a gallium-based alloy is found that is as corrosion-resistant as amalgam and that the tissues tolerate as well, it may well begin to displace amalgam because of the better physical properties and because of better sealing of the cavities.

The direct filling resins are here to stay. If a self-curing resin could be found that would remain adhesive to the hard tooth tissues under oral conditions, then the resin would displace silicate cement just as methyl methacrylate resin replaced vulcanite.

New types of synthetic resins with possible applications as direct filling materials are being developed at an increasing rate, and this should continue during the next ten years. Polymers are being produced that are adhesive to a wide range of materials and are compatible with large proportions of inert fillers. This is a means of reducing the curing shrinkage and thermal expansion which handicap the direct filling resins used today.

PROSTHETIC MATERIALS

Plastic teeth are said to account for about 25 per cent of the total number of artificial teeth sold. This percentage probably will not increase even though the crazing resistance of plastic teeth has been radically improved and the tendencies to blanch and to disintegrate have

been greatly lessened. They will not displace porcelain teeth to any greater degree because of the poor wear resistance of the plastic teeth.

Polymethyl methacrylate has not had a serious challenger for first place as a denture base resin since it was introduced in the late 1930's. There is no development at this date which would indicate that the acrylic resins will be displaced in dentistry by other resins with the possible exception of epoxy resins. This is because of the combination of good values for the physical properties that are important for dental uses.

Soft relining resins will become more extensively used as they improve in quality: so will the self-curing rebasing resins.

INDIRECT METHODS

Indirect methods will be far more widely used because of the saving of chair time for the dentist and the consequent assignment to the dental assistant or technician of tasks that were formerly done by the dentist. The development of superior elastic impression materials based on Thiokol or on silicone rubber will accelerate the use of indirect methods: so will improvement in the materials used for models.

RESEARCH

What dental research has needed is adequate financing. Most dentists are aware of the successful efforts of the American Dental Association to procure a just share of federal biological research funds for dental research. This success is to the everlasting credit of the Association and to Dr. Hillenbrand, its secretary, who directed the drive that acquainted the members of Congress with the need for supporting dental research. Congress was convinced of this need in spite of the past opposition of the Department of Health, Education and Welfare.

If the finances are available, a worthwhile program can be embarked upon and first-class research personnel attracted. It has been said that dental research could not utilize a large sum of money if it were made available: also, that there would be no researchers to perform the dental investigations. This is not a serious problem. The American Dental Association had no real difficulty in procuring adequately trained chemists, physicists, engineers and dentists for the research programs in which it is participating at the National Bureau of Standards and the National Institute of Dental Research.

More funds for dental research are needed besides those from federal sources. It is believed that more funds will be secured during the next ten years from dental societies, dental manufacturers and from philanthropic sources.

Both basic and applied dental research will be greatly stimulated during the next ten years. Perhaps much of this research will center around the structure of teeth, the saliva, nutrition, the flora and fauna of the mouth, the formation of calculus, the mechanism of fluorine protection, the cause of dental caries, and how and why supporting tissues of the teeth are lost. At the same time new methods of treatment, new and improved materials and instruments will be evolved.

Additional control and preventive measures in dental health practice will come chiefly from research; the development of new knowledge and its application are the great hope.

FUTURE TRENDS IN DENTAL EDUCATION

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One cannot discuss the present status of dentistry as a profession, or the arts and science of dentistry as it is practiced, without including the subject of dental education. Also, one cannot predict the future status of dentistry or the future trends in practice and in research without giving consideration to the trends in dental education.

Like all of the professions in the health field, dentistry depends largely on education and depends entirely for its personnel on the dental education programs. Although there are many factors that have an effect on the future of any of the professions, and a study of these will help one to predict many of the changes which will occur, it would seem that a study of the trends in dental education and a study of what the dental schools envision for the future is probably the best single index of what the future holds for the dental practitioner.

It should be pointed out that the importance of dental education to the future of the profession is not determined solely by the undergradate programs in dentistry existing today, or by those which have been the basis for training the majority of dentists who are still in practice. If the scope of the profession were limited to the undergraduate programs that were in existence at the time the practitioner obtained his professional training, we would find it definitely restricted, because only about 46,000 practicing dentists, or about 53 per cent of those now in practice, are graduates of the present curriculum requiring a minimum of two years of predental college study and four years of professional training. This means that the remaining 40,000 dentists obtained their basic study under shorter courses taken prior to 1935, which is only 22 years ago. However, the dental schools and other institutions, as well as both the local and state dental societies, have done a great deal in the way of providing continuing educational experience designed to permit the dentist to avail himself of new information and to make it possible for him to employ the currently taught methods and technics in his practice.

IMPORTANCE OF ADVANCED STUDY

Because continuing education is so important to the growth and development of a profession, as well as to the growth of the individual, it is important to recognize the magnitude of these courses and the numbers taking advantage of them. It is known that there are currently 207 graduate programs being offered in dental schools along with about 100 postgraduate programs. In addition to these advanced programs, which differ primarily in the fact that one leads to a degree and the other does not, the schools provide hundreds of continuing courses that are shorter in length than the graduate and postgraduate programs.

This past year, 446 dentists registered for graduate study, 597 for postgraduate study, and nearly 7,089 for the shorter, continuing courses in accredited dental schools. In addition to these formal courses given by recognized institutions, about 15,000 dentists availed themselves of short courses given by local and state dental societies and many of these were sponsored in part by institutions with their faculty members participating.

Therefore, the dental schools now not only are producing over 3,000 dental graduates each year but they also are making a significant contribution by providing educational opportunities for those dentists who were graduated in previous years. The dentist of the future

Secretary, Council on Dental Education, American Dental Association.

will be one who will have been trained with the facilities of modern dental education. As dental education advances and progresses, so does the practicing dentist keep pace with these advances. It is estimated that about one half of the dentists of the nation avail themselves of the opportunities of present day educational methods during every five year period. This is certainly indicative of the fact that the quality and the quantity of dental service in the future is destined to grow, in part as a result of the desire of these professional men to keep up with the scientific advances taking place in their profession.

The other papers in this symposium have reported on the needs of the nation for dental care, the supply of dentists and the changes in methods of providing this care. The dental schools of today cannot provide enough graduates to maintain the present dentist-population ratio because of the rapid growth in population. It is believed that the use of auxiliary personnel will become increasingly important in the practice of dentistry.

NEED FOR AUXILIARY PERSONNEL

The American Dental Association has anticipated the need for more auxiliary personnel and also the need for training the graduating dentists in the efficient use of all auxiliary personnel. As a result, the Association — through its Council on Dental Education — has first of all encouraged new schools to be developed for training dental hygienists and dental laboratory technicians. In the same way that we take the stand that no health center is complete without a dental education program, any dental education program is something less than complete if it does not train dental students, before graduation, in the use of auxiliary personnel. A dental school program is also incomplete if it does not offer training facilities for at least some of the auxiliary personnel.

The Association has developed educational standards that must be met by the dental schools if they expect to be accredited. Also, the Association has urged and is now requiring that all the dental schools include in their curricula training and experience in the use of these auxiliary personnel. Although the Association currently does not have requirements for the approval of schools for the training of dental assistants, the Council is now studying the function of the dental assistant, and it is likely that the Association will have statements on these functions as well as suggestions, or even requirements, for these educational programs in the near future.

Several conferences have been held during the past three years to discuss the role of the dental assistant as a member of the dental health team. Last October the Council sponsored a Workshop on the Education and Certification of Dental Assistants, which was attended by about 75 persons who studied the problem of delineating what knowledge and skill a dentist may expect his dental assistant to possess.

There are many problems that must be considered when one attempts to increase the supply of dental personnel and auxiliary personnel. Needless to say, these problems are not easy to solve. For example, dental schools and dental hygiene schools cannot be expanded rapidly and still maintain the high standards that are needed. Dental education is an extremely expensive operation for any institution, and until recently there have been critical shortages of qualified teachers. When one considers the expansion of dental service through an increase in the number of dental hygienists, one is faced with another problem, and one which is not apparent, in the case of producing a larger number of dentists or dental laboratory technicians.

The dental hygienists and the dental assistants spend a relatively short time in practice after they enter the field and

hence, even with sizable increases in the number of dental hygienists educated, the total work force is increasing very slowly. Even with the increase in dental hygiene graduates from 400 in 1946 to 900 today, this is only about enough to take the place of the dental hygienists who leave the profession in favor of marriage and for other reasons. One program under study includes attracting back to the profession a good percentage of those who have left it because of marriage. Another plan that is being considered to meet this problem of providing a larger group of dental hygienists is to recruit individuals for admissions to these schools who are older and have decided to make a career of dental hygiene after marriage.

In considering the need for auxiliary personnel, one must recognize the role played by the dental laboratory technician as a member of the dental health team. As has already been mentioned, there are fewer than 3,000 dental laboratory technicians now employed in dental offices and about 25,000 employed in some 7,000 dental laboratories.

The educational programs that have been endorsed for training dental laboratory technicians for the past seven years have been designed particularly for those who wished to work in a dental office. A newer plan now being suggested would train men and women so that they would be competent to work in a dental office and also competent to work in a commercial laboratory. No detailed study has yet been made to determine exactly what the potential needs are for additional personnel in this field. It is obvious, however, that a large number of dental laboratory technicians are needed and will be needed in the future.

The fact that Mr. Moen's study reported that about 95 per cent of all private practitioners make some use of a commercial laboratory is significant; and it is also of interest to know that about 70 per cent of the volume of laboratory work is done in a commercial laboratory. It may be of interest to indicate that the new program for training dental laboratory technicians is designed to include nine months of training, which would customarily be conducted in a vocational school, plus a year of supervised training in a laboratory. This latter part of the program normally would be conducted as an on-the-job training program, thereby helping to increase the supply of trained individuals even before they have completed their courses of study.

At the present time, most dental laboratory technicians are trained in laboratories through an apprenticeship method and trained in only one narrow field of skills. The new program should provide the advantages of some classroom and laboratory instruction with a well formalized course of study to be conducted through the medium of a type of preceptorial instruction.

NEED FOR INCREASING EDUCATIONAL FACILITIES

Although the construction of new dental schools and dental hygiene schools cannot move ahead rapidly, and expansion also is restricted, some estimates can be made about the future trends in new schools. There were 40 dental schools in 1947 and 47 admitted classes this fall, showing an increase of 17.5 per cent. The number of students admitted has increased during the same time from 3,000 to 3,600—which is an increase of 20 per cent; and some of this increase will not be reflected in the number of graduates for another four years.

It is anticipated that in the next ten years there probably will be an additional six or seven schools, which may include schools in Colorado, Florida, New England, New York, Oklahoma, and South Carolina. If six are started, they probably will add about 350 additional graduates a year. During the next ten years there probably will be another 10 or 12 new dental hygiene schools, and perhaps half

of these will be outside of existing dental schools; these will swell the number of dental hygiene graduates by about 400. All of this is in addition to the expansion of the present facilities in existing dental schools and dental hygiene schools.

The recent legislation which provides funds for dental research and that which provides matching funds for building research facilities will also help the schools in their over-all program of expansion. This legislation is only a beginning, for it is expected that during the next ten years—and possibly starting within two years—there will be legislation providing federal funds on a matching basis not only for new dental schools and for operational costs, but also for expansion of present educational facilities. If these funds become available, as we expect they will, the previous estimates on expansion may be doubled.

The expansion of educational facilities is not limited, of course, to dental schools and to institutions training auxiliary personnel. The number of training programs within hospitals is increasing constantly, and with these expansions also comes an increase in the amount of dental care being given at these hospitals. There are now 273 approved educational programs in 190 hospitals, and there are probably 100 additional hospitals with educational programs that will be eligible for evaluation in the next five or six years. In fact, it has been predicted that the extent of the increase in the number of dental education programs in hospitals will be limited only by the number of dentists interested in enrolling in these training programs.

It is impossible, in the space available, to describe the total influence that even present day dental education is to have on dentistry and dental practice in 15 years; and the foregoing comments have dealt primarily with the general influence of education both at the undergraduate and postgraduate level, the increase in the number of graduates, the number of schools, and the amount of dental research.

ROLE OF DENTAL SCHOOL TEACHERS

There are about 4,000 teachers in our dental schools and of these, about 800 devote full time to their chosen professions of both dentistry and education. It is important to emphasize that it is upon these 4,000 dental school teachers that the future of dentistry must depend in a large part. These are the men whose responsibility it is to keep abreast of all the current advances in the practice of dentistry and to visualize what will be the patterns of the future so that they can train and educate their students to fit into the dental picture of the future.

It is fortunate for dentistry and for dental education that the profession—through its Association—encourages experimentation and does not stereotype or regiment the curriculum or the methods of teaching. All schools are engaged in some sort of experimentation, even though it may not be revolutionary. All are engaged in finding improved methods of instructing students; in finding improved ways of helping students acquire skills, and in finding better ways of preparing the student for dental practice after he graduates.

ROLE OF DENTAL SPECIALTIES

One cannot ignore the impact that specialty practice will have on dentistry of the future. Seven dental specialties—dental public health, oral pathology, oral surgery, orthodontics, pedodontics, periodontology and prosthodontics—have been recognized by the Association; each has a board whose function it is to determine the eligibility of dentists who are to be listed as diplomates of that specialty board. It is recognized that the principal requirements for a specialist include two or three years of advanced training and

considerable experience in the particular subjects related to the specialty. Nearly all schools are providing advanced training for at least some of the recognized specialty areas and many also are offering advanced study in other fields that are new and not yet recognized as eligible to be termed "specialties of dentistry." Advanced study in all these fields is to be encouraged.

There are currently about 1,400 diplomates of the seven specialty boards. This number is increasing rapidly considering the fact that some of the boards are still fairly new in organization and have not had time to certify many specialists. Also, the number of graduate and postgraduate courses is growing, thereby making it possible for more men to qualify for the educational requirements. However, it is likely that there will never be an extremely large number of diplomates, and the great majority of dental service will continue to be rendered by the general practitioner. It is also of interest to note that the philosophy of the Association is that dentistry must not be oversegmented with a large number of specialties and, hence, it is not likely that additional specialties will be announced in the near future. There is not space to pursue the problem of dental specialties adequately in this paper. However, it should be noted that although some areas presently are not given independent status as a dental specialty, consideration is being given to provide these areas with recognition. In some instances this may be done by making them a part of an existing specialty area and it is possible that the time may come when some of the newer areas will become eligible for a different type of recognition.

All the dental schools give essentially the same kind of experience and education to the undergraduates, for all have as their goal the equipping for a graduate to be eligible for licensure in any state in the Union. The schools that offer graduate study, and those that have facilities for sponsoring research, tend to specialize. They do not try to cover all areas of advanced study and research, for they find that this would necessitate such a wide spread of activities and such a huge outlay of funds that they could not do justice to each of the areas. Therefore, each of these schools tends to specialize by taking as its responsibility certain of the fields in which it finds it possible to build up strong departments staffed with leaders in the field and with space and equipment that make their facilities outstanding.

CONCLUSIONS

Dental schools today devote an increasing amount of time to teaching the student the importance of viewing a patient as a whole, and not only teach the student the importance of physical examinations or surveys but also teach him how to make these examinations and prepare his case reports. The student who will be graduated tomorrow will be taught many more of the facts about practice management than the students of previous years and will be given first-hand experience both in private offices and in hospitals so that he may be able to plan his professional career better and to acclimate himself when he enters practice.

It is gratifying to report that dental educators today utilize all the facilities that are available to produce better programs, so that the product from their schools will continue to be better educated and better experienced than those graduated by these schools in previous years. Deans, department heads and other faculty members are taking a greater interest in becoming familiar with the programs conducted at the other schools so that there will be a greater sharing of ideas and more cooperative programs. Schools and faculties do not operate in a vacuum; they use ideas obtained from other schools as well as from other departments on their own campuses.

There has never been a time when the schools have been as cooperative in working with outside agencies as they are today. The schools are willing and anxious to obtain new ideas for the improvement of their teaching and are anxious, of course, to receive the counsel and advice from those who are in practice. It is logical that the dental profession, the schools and the various auxiliary personnel, as well as the Council on Dental Education, could profit from conferences to study the problems of dental education and to study the services and the activities in which the dentist of the future will be engaged.

DENTAL PRACTICE DURING THE NEXT TEN YEARS

R. H. Friedrich, D.D.S., Chicago

Making predictions of things to come in dental practice presents two pleasant but dangerous temptations. The first is the desire to take the cosmic approach, anticipate the millennium and design a utopia where dentists are forever free from care and responsibility. The second is to adopt the "I've got a secret" approach of the newspaper columnist with the hope that no one will remember the purely speculative predictions which fail to materialize. Such predictions are not the things of which the dreams and plans of the American Dental Association are made. Valid predictions on the future of dental practice are closely related to the past and completely dependent on the cold hard facts of the present. These cold hard facts are as follows:

1. Professional status has been established by the people in order to provide a source of judgment and decision that individuals are unable to exercise for themselves. A profession thus established has the dual responsibility to develop its own particular competence according to the highest standards and to adapt that competence to the needs of the people. The dental profession has met the first responsibility through progressive and dynamic efforts to improve the quality of dental care. The profession is meeting the second responsibility through an effective dental health education program to increase the public's appreciation of good dental health and through active consideration of socioeconomic trends in order to develop methods and programs which will allow it to adapt its established scientific and technical competence to the needs and demands of the people.

2. The early economy of this country was a rural economy, and the social and economic problems revolved around the individual. When the country underwent its tremendous industrial development, the social and economic problems began to call for the collective appraisal of groups of people and of the community as a whole. Consideration of the health problems of the individual has been expanded to include the health of the public as a whole.

3. In the expansion of the industrial economy and its technological advances, the manpower of the country has become recognized as one of the basic resources of the mass production, mass distribution and mass consumption which support that economy. The importance of the health of this manpower—in addition to its importance to the personal welfare of the individual—has assumed the proportions of that of a public utility.

Against this background of social and economic change, the dental profession can expect to be confronted with ever-increasing requests for an expansion of dental health services. As it was so well

Secretary, Council on Dental Health, American Dental Association.

stated in a paper presented before the 7th National Dental Health Conference in 1956 in Chicago, "No profession conscious of its obligation to society can ignore or frustrate such requests coming from larger and larger groups of our population. Whatever happens in our changing society, it is clear . . . that the American people deserve to have a higher level of health care, including dental health care, as a part of their increasing standard of living. It seems . . . also to be obvious that the American standard of living cannot go on increasing, as it has done almost for the last generation, without making a real part of that better standard of life a better standard of dental health care."[1]

INCREASING DEMAND FOR DENTAL CARE

The first prediction is that the demands for dental care will increase significantly in the next ten years. The dental profession, then, must provide the leadership required to increase the production and distribution of this care. It must also continue to assure that the highest standards of dental care and the professional integrity of the dentist-patient relationship will be maintained in any programs developed to increase the production and distribution of dental care.

The increased production of dental care will depend on the achievement of several basic aims which are:

1. A tremendous expansion of activity in basic research in order that the nature of dental disease may be understood better and programs for its prevention may be developed.

2. The expansion of dental education facilities in order that dentist-population ratios can be maintained at least at their present level and that the research potential of the dental schools can be increased.

3. A tremendous increase in the efficiency of dental practice in order that the limited professional work force can produce more dental care and make it available to more people.

The increased distribution of dental care will also depend upon the solution of additional problems:

1. How to expand programs of dental health education in order that the public will develop a better appreciation of the benefits of sound dental health.

2. How to improve and expand methods for meeting the costs of dental care in order that the public may avail itself more generally of the benefits of dental health.

CHANGE IN TREATMENT PROBLEMS

It has been apparent for a long time that the existing dental care needs cannot be met by therapy alone. For example, up to the present time, the burden of the treatment of dental caries has prevented adequate application of therapeutic efforts to the basic dental health problems of developing and maintaining functional occlusion. Until the occlusion problem is better understood and treated, the handmaiden of malocclusion, periodontal disease, will continue to be the leading cause of tooth loss. Up to the present time, research efforts of the dental profession have been, in large measure, directed to the problem of reducing the incidence of dental caries with the result that the solution is no longer only a possibility; it is a reality. The benefits of fluoridation have been established. Its implementation as a public health measure is proceeding satisfactorily and will increase as the public learns of its preventive benefits and demands them of public officials. Further research, particularly in the field of nutrition, the development of early treatment programs and programs of dental health education indicate that the elimination of dental

1. Hillenbrand, Harold. Dentistry's responsibility in the changing socioeconomic pattern. J.A.D.A. 54:164 Feb. 1957.

caries as a major factor in dental disease is a real possibility.

The dental profession's efforts in developing public interest in dental research have produced concrete recognition in the expansion of research appropriations for the National Institute of Dental Research. The program being developed under these increased appropriations not only will increase the understanding of dental disease and of the need for public health programs for its prevention, but also will broaden the base of dental research to include technological and applied research. Increased research activities will, in turn, result in more efficient methods and technics for rendering treatment.

It is safe to say, therefore, as the second prediction, that the next ten years will bring about a distinct change in the treatment problems confronting the dentist. With caries continuing to be brought under control, less and less operative therapy will be required to restore the ravages of dental decay. There will continue to be an increasing demand for new and better therapeutic methods and materials to restore tooth structure lost through occlusal function and wear. The demand for such therapy will increase especially among older persons, for among this group the effects of occlusal wear will become particularly apparent. As teeth are maintained in the mouth to an older age, the problems of occlusion, malocclusion and periodontal disease will be brought into sharper focus. The dental profession will begin to devote its major effort to the correction, restoration and maintenance of occlusion. As the need for restoration of the entire tooth or teeth is reduced, prosthetic requirements will shift toward partial restorations of individual teeth.

CONTINUING EDUCATION

Another paper in this symposium will discuss the anticipated changes and developments in dental education in the next ten years. My only comment is that our educational institutions will have a twofold responsibility in developing new methods of therapy and practice: (1) to meet the changing needs of the dental profession, and (2) to adjust educational programs to produce the type of dentist who can cope with the changing problems of the profession.

On the basis of the previous predictions of an ever-increasing demand for more dental care, changes in treatment problems and the expansion of dental care services for mentally ill, the chronically ill, and the aging, the third prediction relates, appropriately, to the need for the profession to enlarge programs of continuing education for its members. Such programs should be concerned with methods for making dental practice more efficient in the dental office, for developing efficient institutional practice in all types of hospitals and other institutions which have a health function, and for extending care to the homebound patient.

Efficient Dental Practice • The "do it yourself" philosophy which has brought the practice of dentistry to its present state of development must now give way to a planned program for bringing all of the specialized resources of business administration, production technology and production efficiency to bear on the problems of dental practice.

Studies have been made to determine what can be done to limit the activity of the dentist to his purely professional function of rendering dental care. The Richmond-Woonsocket studies[2] conducted through a cooperative effort of public health dentists at all levels have demonstrated—both to the dentist and to the larger volume of patients it was pos-

2. Waterman, George E. The Richmond-Woonsocket studies on dental care services for school children, J.A.D.A. 52:676 June 1956.

sible to care for—the advantages of methods which would permit such limitation. These studies indicate very clearly that the dentist can produce much more dental care for many more people with considerably less drain on his physical and nervous energies when he is supported by sufficient, well-trained auxiliary personnel.

The initial studies should be extended to include sound time and motion studies of the function of a dental office, necessary operating equipment and dental office personnel. Other studies must be made of the business operation of the dental office, including the legal and business arrangements under which groups of dentists can conduct more comprehensive and efficient practices.

When the dental office is considered as a community resource for the distribution of dental care, it becomes apparent that a great deal can be done to increase its efficiency and to provide for its continuity of function. The present system under which new graduates establish new dental offices and develop new practices, with relatively low productivity during the developmental period, results in economic waste to the public and the dentist. Such waste could be avoided if established group practices were available to absorb the new graduates and make their professional skills immediately available to an established clientele.

There is already a trend toward the development of group dental practice in many different forms. This trend is hampered by a general lack of specific information and knowledge of business principles which would assist in overcoming the traditional reluctance of the dentist to forego the complete but expensive freedom of a solo practice for the demonstrated advantages of a group effort supported by an efficient and well-trained auxiliary team. Group practices which have been developed and are functioning successfully provide some definite indications of the dental practice of the future.

Architectural knowledge, skill and imagination are being added to the known professional requirements of the dental office. The operating room of the office already is being designed on the basis of function. It is being separated from the service area where the duties of the general service assistant can be performed without interfering with the specific function of rendering dental care. The business office is being located and designed according to its function and to the need for its separation from the operating area.

Some of the trends in office design are already clear. The dental operating room will be smaller. Its equipment will be simpler and functional in design and will be limited to the actual operating needs of the dentist and his operating assistant. Both will be seated within arm's reach of all essential instruments, materials and operating equipment. Offices will require multiple operating rooms which will be serviced by a central service assistant working out of a central services area. There is evidence that the trend will be toward open operating bays with less complete walling off of rooms to allow a better flow of traffic and to provide a more attractive environment for patients and operating personnel.

There will be a trend toward the expansion of prosthetic laboratory facilities in the future dental office, particularly in group practices, in order to maintain close professional control over those functions and decisions which can be effected best in the presence of the patient. In prosthetic fabrication, there will be a greater separation of the purely mechanical phases from those which require professional judgment and determination. The commercial laboratory of the future will perform those functions which are completely mechanical in nature and can be standardized through the maximum use of technological controls.

The Council on Dental Health of the American Dental Association is presently engaged in a project to study the design

of the dental office in relation to its most efficient function. This project will include architectural studies of such factors as arrangement of areas of the office in relation to function, patient flow and space requirements. Motion and time studies will be designed to determine how to relieve the dentist of the maximum of nonprofessional responsibilities and how to develop methods and technics that will allow him to perform the maximum of dental care with the minimum of physical energy. These studies will be designed also to determine the most efficient use of auxiliary personnel.

Additional studies will be conducted to determine the most efficient system of business and professional record-keeping for the dental office as well as the most efficient application of sound business principles to the dental practice. The latter might well include the application of cost accounting to the determination of fees.

The present trend toward group practice makes it essential that the Council project include a full study not only of the physical arrangement of the dental office and the legal and business factors but the psychological problems involved in the team function of dentists and auxiliary personnel working in a close relationship. It is particularly important that such a grouping of separate skills for the sake of efficiency does not interfere with consideration for the individual welfare of the patient.

The details of such a project as that being undertaken by the Council on Dental Health make it clear that all of the resources of architecture, industrial design, law, business administration, psychology and sociology must be joined with those of dentistry if the profession is to produce accurate and dependable information. It is no "do it yourself" project for the dental profession to undertake through volunteer effort. Such a project will require adequate financing, and the necessary financial support must be sought.

Efficient Institutional Practice • Increasing awareness of the opportunities to provide an improved health service to the public through the integration of dental services with other services rendered in the hospital are being reflected in the growing number of hospitals that are establishing complete dental departments. This development is resulting from (1) the opportunity for state and local dental societies to expand the capacity of dental practice to meet the increased demand for dental care, and (2) the opportunity for hospitals to help meet their community responsibilities by providing a total health service.

A trend of particular significance, also, is that toward the development of health programs for persons with mental and chronic illnesses and the expansion of hospital facilities for the care of such patients. The demand for dental care under public assistance welfare programs, which undoubtedly will be expanded as the result of recent amendments to the Social Security Act, likewise can be met effectively in the hospital. There, the efforts of the community, the hospital and the dental society can be coordinated to produce a dental care program of high standards.

There will be an increasing demand for dental equipment to meet the needs of the hospitalized patient and the limitations of his physical and mental condition. More and more dental care will be performed under general anesthesia or varying stages of sedation. More and more dental care will be rendered in conjunction with and related to the general health care of the patient. Dental care provided during periods of hospitalization for general health care will allow for maximum health benefits to be derived from such hospitalization and provide a greater return to the patient for his time and money.

Care of the Homebound Patient • Chronic illness programs must provide for the homebound patient who does not

require hospitalization but who requires dental care. Here again, there will be a need for new technics and portable equipment which are simple but efficient.

AVAILABILITY OF DENTAL CARE

Increasing the production of dental care will not improve the dental health of the public materially unless the public appreciates the benefits of such care to the personal welfare of the individual and the public welfare of the community. A study conducted in 1929[3] indicated that 20 to 25 per cent of the people had gone to their dentists in the preceding 12 months. Subsequent studies showed that, in 1949,[4] the percentage had increased to 40 per cent and that, in 1952,[5] it had risen to 42 per cent. Although a great many factors must be credited with causing this increase in the public appreciation of dental health, it can be assumed that dental health education programs are largely responsible. To assure the extension of such appreciation, dental health education programs will have to be expanded by every proper source and method.

In addition to an appreciation of the benefits of good dental health, the public must have available the means for meeting the cost of dental care. The problems associated with payment for dental care are receiving attention from agencies in many areas—from government, through programs for vocational rehabilitation of handicapped persons, public assistance welfare recipients, veterans, military dependents and civilian employees; from labor unions and management, through programs financed by health and welfare funds for group purchase of dental care; from insurance companies, through application of the insurance principle to group risks; from Blue Shield and Blue Cross, through provision of certain acute medical and surgical procedures for predetermined premiums, and from dental societies, through establishment and development of budget payment plans in cooperation with banks or specialized financial agencies for the individual purchase of dental care.

All of the foregoing efforts are being directed toward the goal of removing from the individual the responsibility for administering the budgeting and payment for health care through his personal finances, of eliminating the heavy burden of the costs of catastrophic disease episodes and of making health care immediately available at the time of need without consideration for the availability of personal funds.

The public response to these programs presages a continuing and expanding challenge to the dental profession to improve the business management of dental practice. Furthermore, the profession must surround any plans for meeting the costs of dental care with the proper safeguards to protect the professional integrity of the dentist-patient relationship and to assure the highest standards of dental care in the interest of the public.

Based on the demonstrated willingness of the profession to experiment with the economic problems of dental care, it is logical to predict the continuing expansion and improvement of methods for meeting the costs of dental care. This improvement will tend to minimize the effect of economic changes on the demand for dental care. As more and more individuals in this country are made personally aware of the benefits of good dental health, it will become an integral part of the ever-increasing standard of living.

3. University of Chicago Committee on the Cost of Medical Care. Medical care for the American people: final report. Chicago, University of Chicago Press, 1932, p. 11.

4. American Dental Association, Bureau of Economic Research and Statistics. 1950 survey of dental practice. Chicago, American Dental Association.

5. American Dental Association, Bureau of Economic Research and Statistics. 1953 survey of dental practice. Chicago, American Dental Association.

Endodontic treatment with a zinc oxide - Canada balsam filling material

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Edward C. Wach,† Ph.G., D.D.S., M.S., Chicago

A report on a study of the physical properties of several root canal filling materials was published in THE JOURNAL in 1955.[1] One of the materials tested, a zinc oxide - Canada balsam preparation which was formulated by one of us (E.C.W.), has been used by us in the clinics of the College of Dentistry, University of Illinois, and by other dentists for about 30 years.

The composition of this material is as follows:

Powder
Zinx oxide, 10 Gm.
Calcium phosphate, 2 Gm.
Bismuth subnitrate, 3.5 Gm.
Bismuth subiodide, 0.3 Gm.
Heavy magnesium oxide, 0.5 Gm.

Liquid
Canada balsam, 20 cc
Clove oil, 6 cc

METHOD OF TREATMENT AND RESULTS

The case reports in this paper are based on findings from followup roentgenograms of patients in whom the material was used in endodontic treatment. The zinc oxide - Canada balsam preparation will be referred to hereafter in this paper as the plastic filling material.

The usual endodontic procedure was followed in all instances. Various medicaments were used, and thorough cleansing, curettage and enlarging of the root canal were carried out to gain access to the apical foramen. Subsequently, the root canal was filled completely.

In the series of patients treated, radiolucent areas were resolved, and there was complete resorption of the plastic filling material and the gutta percha points in the instances in which there had been pronounced overfilling of the root canal.

The process of resorption seems to cease when the filling material has been resorbed to the apex of the root. The age of the patient seems to be a factor. It was observed that the younger the patient the earlier healing and resorption took place.

REPORT OF CASES

Case 1 • A 36 year old woman appeared for treatment of an acute swelling on the lingual surface of the upper left lateral incisor in

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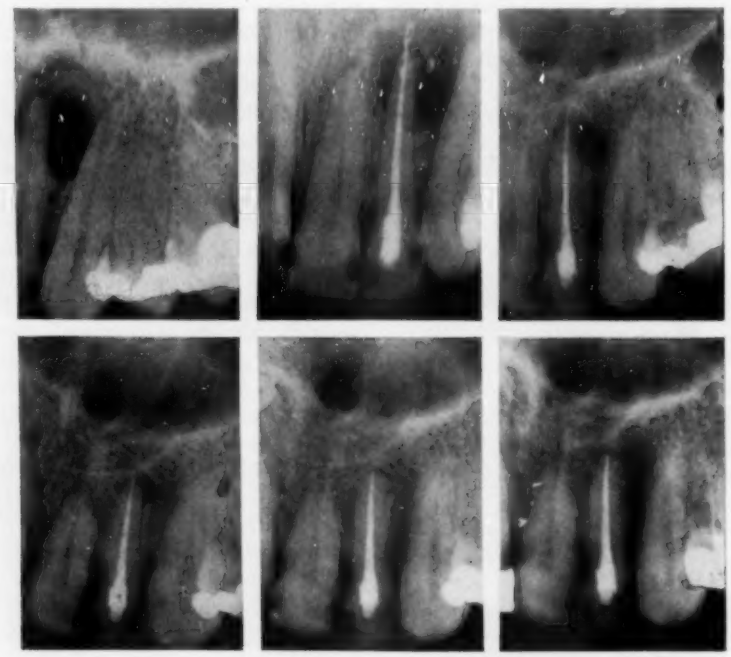
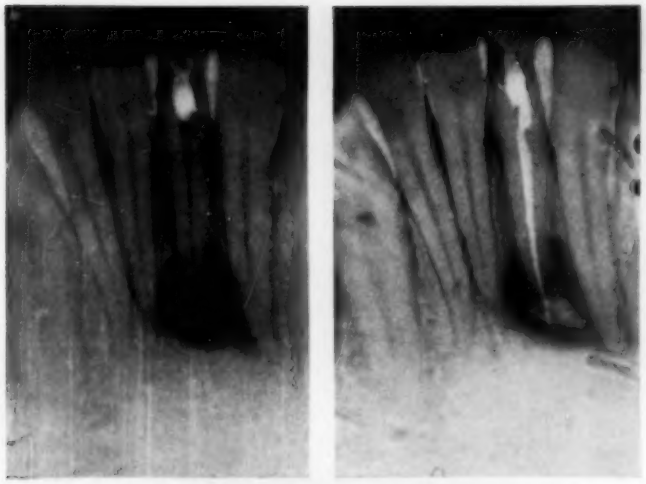
1. McElroy, Donald L. Physical properties of root canal filling materials. J.A.D.A. 50:433 April 1955.

September 1940. The diagnosis was acute alveolar abscess. The tooth was opened through the lingual surface and was left open about ten days until the acute symptoms had subsided. Then, treatment of the root canal was begun. Treatment consisted of curettage, irrigation with chloramine solution and dressings of equal parts of beechwood creosote and tincture of iodine. Three weeks after the patient's first visit, the canal was overfilled with the plastic filling material and gutta percha points, which were thoroughly condensed in the canal.

Roentgenographic Findings • Before endodontic treatment, a roentgenogram of the tooth showed an apical radiolucent area that had a punched out appearance and was about 10 mm. by 10 mm. in size (figure, above left). After endodontic treatment in October 1940, examination showed that the size of the radiolucent area was about the same and that the gutta percha point and the plastic filling material extended through the apical foramen and into the radiolucent area (figure, above center). Roentgenographic examination in June 1942 showed that the plastic filling material had resorbed slightly and that the radiolucent area had decreased slightly in size. By June 1943, the plastic filling material had resorbed, and the radiolucent area continued to become smaller (figure, above right). Continued filling in of the radiolucent area and severing of the gutta percha point near the end of the root were revealed by roentgenographic examination in June 1944. Examination in June 1946 showed that the portion of the point outside the root canal had completely separated from the portion in the canal (figure, below left). By June 1947, the radiolucent area had almost disappeared and the detached portion of the point appeared to be moving slightly mesial to the root apex. In a roentgenogram made in June 1950, it was difficult to distinguish any evidence of the point outside the root canal (figure, below center). Roentgenographic examination in June 1953, showed that the radiolucent area had filled in completely, and in June 1954 the roentgenographic appearance was essentially normal. A roentgenogram made in December 1955, 15 years after treatment, showed that the tooth was normal in appearance (figure, below right).



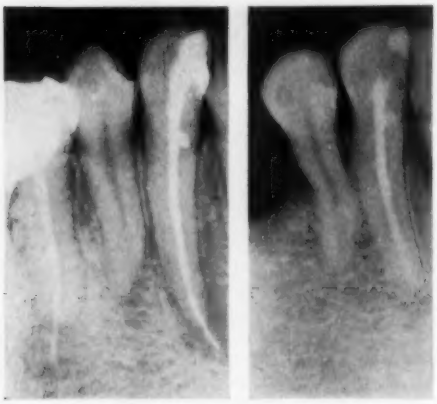
Case 1



Case 2

Case 2 • A 21 year old woman appeared in October 1947 with a swelling involving the submental region. A diagnosis of acute alveolar abscess of the lower right central incisor was made. When the abscess had localized, the root canal was opened through the cingulum region, and the abscess was incised in the mucobuccal fold and a drain was placed. When the acute symptoms subsided, endodontic treatment was instituted, consisting of curettage, irrigation with chloramine solution and dressings of equal parts of beechwood creosote and tincture of iodine. The canal was overfilled with a combination of gutta percha points and the plastic filling material, both being thoroughly condensed.

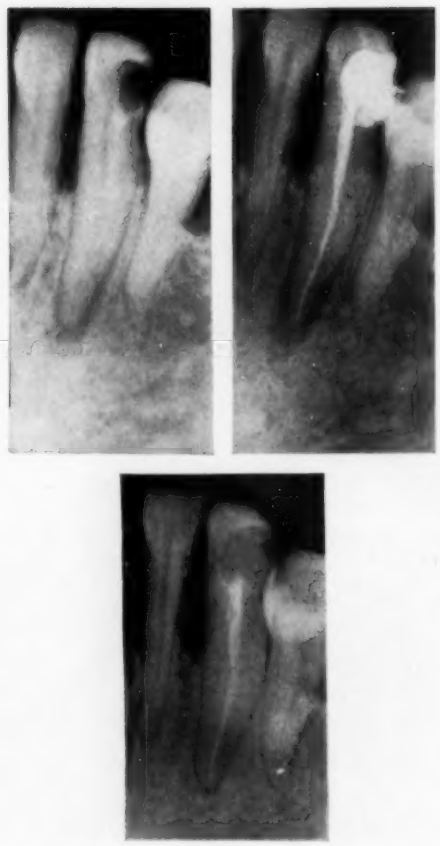
Roentgenographic Findings • In October 1947 the lower right central incisor showed an apical radiolucency about 8 mm. by 9 mm. in size (figure, above left). In November 1947 a roentgenogram showed that the plastic filling material and the gutta percha points extended into the radiolucent area after the canal was filled (figure, above right). In November 1954, seven years after endodontic treatment, roentgenographic examination showed that the plastic filling material and gutta percha points which had formerly extended into the radiolucent area had disappeared. The radiolucent area had also disappeared, and the tooth was normal in appearance (figure, below).



Case 3

Case 3 • A 19 year old boy appeared in January 1933 for treatment of a discolored lower left cuspid that was slightly tender to percussion. An opening was made into the root canal, and the tooth was allowed to remain open for drainage about ten days. Root canal treatment consisted of curettage, irrigation with chloramine solution and dressings of equal parts of beechwood creosote and tincture of iodine. The canal was filled thoroughly with the plastic filling material and gutta percha points.

Roentgenographic Findings • A roentgenogram taken of the tooth after root canal filling showed that the lower cuspid was overfilled, with a gutta percha point extending into the radiolucent area at the root end. A granuloma was diagnosed (figure, left). In February 1955, the patient returned to the city after a long absence and a roentgenogram was made of the tooth. There was no evidence of the gutta percha point which formerly extended into the area that was radiolucent. The roentgenogram, which was made 22 years after endodontic treatment, showed no radiolucent area but rather a quite normal appearance (figure, right).



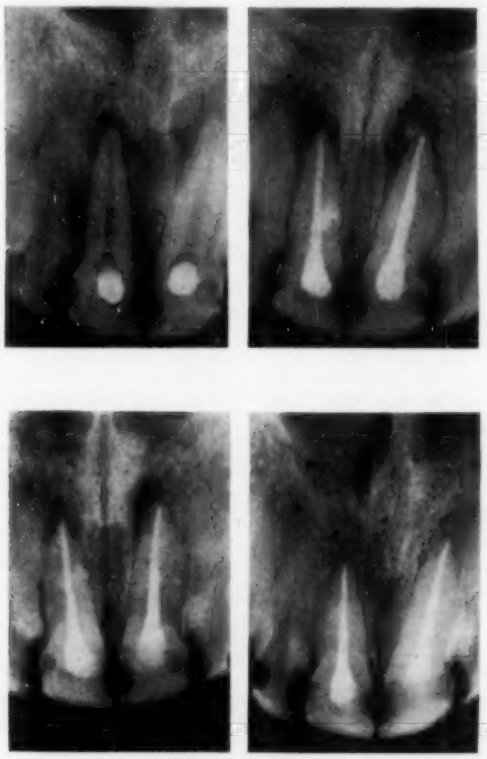
Case 4

Case 4 • A 32 year old woman appeared for treatment in March 1943 with an apparent periodontal condition and a lower cuspid with a deep cavity involving the pulp. The patient insisted that an attempt be made to save the tooth. Pulp tests indicated no vitality. The root canal was opened, and treatment was instituted, consisting of curettage, irrigation with chloramine solution and dressings of equal parts of beechwood creosote and tincture of iodine. The canal was filled thoroughly with the plastic filling compound and gutta percha points.

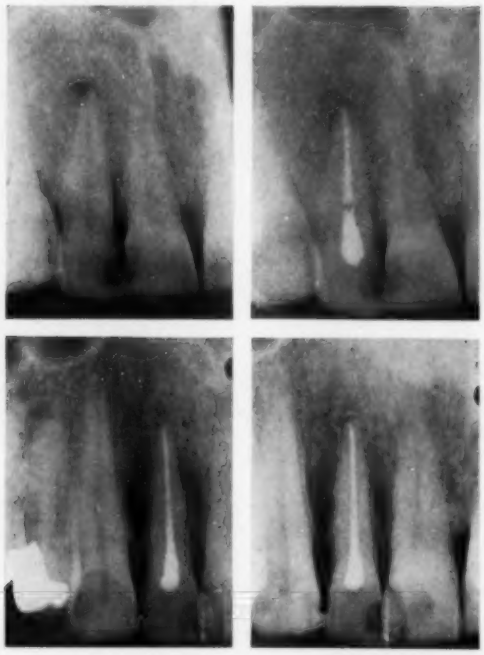
Roentgenographic Findings • A roentgenogram made in March 1943 showed a lower cuspid with a periapical radiolucency and a decided loss of bony alveolar support (figure, above left). A roentgenogram made in April 1943 showed the tooth to have a well-filled root canal and periapical involvement (figure, above right). A roentgenogram made in April 1945 showed that the radiolucency had disappeared completely (figure, below).

Case 5 • A 24 year old woman appeared for treatment in April 1953. Both the upper right and left central incisors had discharging sinuses on the labial alveolar surface near the apexes. The teeth were opened through the lingual surfaces and allowed to drain. After about two weeks, the teeth were treated by curettage, irrigation with chloramine solution and dressings of equal parts of beechwood creosote and tincture of iodine. The canals were filled thoroughly with the plastic filling material and gutta percha points. Some of the plastic filling material was seen exuding from the sinus openings.

Roentgenographic Findings • On a roentgenogram made in April 1953 the upper right central incisor showed an apical radiolucent area about 5 by 8 mm. in size. The upper left central incisor showed a radiolucent area about about 5 by 5 mm. in size (figure, above left). The next roentgenogram made in April 1953 showed the two incisors to be filled well, with some of the plastic filling material occupying the radiolucent area (figure, above right). A roentgenogram made six months later, in October 1953, showed that the plastic filling material was resorbing and that the radiolucent areas were becoming much smaller, indicating that repair was taking place (figure, below left). A roentgenogram made in September, 1955, showed that the plastic filling material had disappeared and that the radiolucent areas had gone (figure, below right). Also, the sinus openings could no longer be found on the labial surfaces.



Case 5



Case 6

Case 6 • A 32 year old man appeared for treatment in October 1934 with an upper right lateral incisor that was slightly tender to percussion. The tooth was opened through the lingual aspect and was allowed to drain for ten days, after which the tenderness had disappeared. Treatment of the root canal then was instituted. It consisted of curettage, irrigation with chloramine solution and dressings of a solution of hexylresorcinol (S.T. 37). Then, the canal was filled with the plastic filling material and gutta percha points, both of which were thoroughly condensed in the canal.

Roentgenographic Findings • Roentgenographic examination in October 1934 showed that there was a small radiolucent area about 3 by 6 mm. in size at the apex of the incisor (figure, above left). A roentgenogram made in November 1934 showed that the root canal filling was well condensed, with some material extending through the apical foramen (figure, above right). A roentgenogram made in 1938 showed that both the radiolucent area and the excess filling material had disappeared (figure, below left) and in a roentgenogram made in 1956, 22 years after treatment, the tooth appeared normal (figure, below right).

CONCLUSION

The use of well-condensed zinc oxide-Canada balsam filling material, which will fill the root canal completely and will not contract, will ensure favorable results from endodontic treatment provided the patient is in normal health.

The series of instances reported demonstrates that, when the filling material has adequate access to the root apex, usually there is no necessity to correct apical radiolucent areas by surgery. The clinical results obtained with the plastic filling material verify the laboratory findings reported previously.

The condensation of amalgam

George M. Hollenback, D.D.S., M.S.D., Los Angeles

The objectives in the making of all single tooth dental restorations are (1) to restore the damaged organ to complete anatomy and function, (2) to prevent the further ingress of the disease process to the remaining portion of the organ, (3) to maintain the dental pulp and the investing tissues in a normal state of health and well-being and (4) to restore the damaged organ to its normal beauty and color.

DEFECTS IN RESTORATIONS

It has been the consensus, until recently, that prevention of ingress of the disease process to the remaining portion of the organ can be achieved only by adapting the restorative material so closely to the cavity walls that a hermetic seal is made, preventing the ingress of moisture, bacteria or any other foreign substances. Clinical observation over a long period has led me to believe that this theory is untenable. During this time, I have seen few restorations that have not shown defects in marginal adaptation. In the majority of instances, however, such restorations have served clinically quite well.

Two restorative materials, amalgam and silicate cement have shown, to a considerable degree, their ability to resist the recurrence of caries. In a table[1] giving the chemical composition of 12 silicate cement powders, it was noticed that the fluorine content in nine of them is from 5.9 to 15.4 per cent by weight. Many investigators have noted that even extremely defective restorations made with this type of material have been effective in preventing recurrence of caries. It seems logical that the fluorine content of this type of cement is responsible for this remarkable property.

The salts of all the metals used in dental amalgam are germicidal. Here, again, it would seem that these salts have sufficient caries-inhibiting properties to prevent recurrence of caries in defective restorations in many instances.

Countless instances have been observed in which gold foil restorations with defects so gross that they could be discerned easily with the naked eye have performed clinically very well. Because gold is one of the most chemically inert of all metals, it is difficult to understand how defective foil restorations can possibly endure.

A recent investigation[2] using radioactive calcium has shown that restorations of all types and materials do not hermetically seal the cavity.

In view of the mentioned facts, no one should assume that all dental restorations are so defective that the time and effort consumed in adapting them to cavity walls is futile. It must be borne in mind that close adaptation of restorative material is only one of the requirements of a successful restoration and that these re-

Professor of dental materials, School of Dentistry, University of Southern California.

1. Skinner, E. W. Science of dental materials, ed. 3. Philadelphia, W. B. Saunders Co., 1946, p. 150.

2. Armstrong, W. D., and Simon, W. J. Penetration of radiocalcium at the margins of filling materials: a preliminary report. J.A.D.A. 43:684 Dec. 1951.

quirements can be met only by the expenditure of time and skill in the placing of the restoration.

Many materials have been advocated for the making of restorations. None of them has been entirely satisfactory. Some are of considerable value, though leaving much to be desired; others have possessed so few good qualities and so many undesirable ones that it seems logical that they should be eliminated from further consideration. As to the physical qualities of amalgam, I believe that it should be classed as a material having great value, though leaving much to be desired.

QUALITIES OF AMALGAM

Purely scientific studies of dental amalgam in the laboratory would indicate that this material, owing to its many undesirable physical properties, could not perform well in clinical use; however, such use has shown that this material, for a variety of reasons, has performed well. A survey,[3] which was well conducted, showed that not only are more restorations made with amalgam than with all other materials combined, but it also has a higher percentage of success to its credit than even gold foil and inlay restorations. Surely, a material which has performed so well is worthy of all possible consideration in the expenditure of technical skill in its use.

A great deal of time and effort has been put forth in the study of dental amalgam. This has been productive of incalculable good. Not only have dental amalgam alloys themselves been greatly improved, but, still more important, rational technics have been developed which tend to make the most of its many desirable qualities and to minimize the effect of its undesirable ones. The dental profession now has a scientific and common sense basis for procedures. Also, amalgam alloys have been greatly improved and have been fitted to perform much better under clinical conditions. This has been done by using more highly refined metals for making the alloy and better methods for melting, cutting, annealing and grading the particle size. These alloys will produce an amalgam that will have stability, strength, density and comparative freedom from tarnish and flow, with volume change controlled within definite, prescribed limits. Such an amalgam, when intelligently used, is capable of making restorations of a high degree of excellence.

All the certified amalgam alloys on the market, when properly used, are capable of making good restorations. Research has shown, however, that all certified alloys are not of equal merit, there being considerable difference in their excellence.

American Dental Association Specification No. 1 for Dental Amalgam Alloy sets forth certain minimum standards which must be equaled, or exceeded by, a given alloy before it can be certified.

CONDENSATION OF AMALGAM

In considering the condensation of dental amalgam, the following physical properties are of interest: the compressive strength of the amalgam, its constancy of volume, and its ability to resist flow and tarnish.

It should be borne in mind by every user of dental amalgam that the use of improper technic in combining the alloy and mercury can very seriously affect the physical properties of the amalgam. Overmixing will produce an amalgam that, although having a high compressive strength, will tend to shrink in proportion to the amount which the amalgam has been overtriturated. American Dental Association Specification No. 1 has also laid down the following requirement relative to setting change: "Twenty-four

3. Brekhus, P. J. Report on dental caries in 10,445 university students (1928-1930). J.A.D.A. 18:1350 July 1931.

hours after amalgamation the length shall have increased between 3 and 13 microns per centimeter."

There is justification in assuming that this provision must be considered more or less arbitrary, its merit being due to the fact that an alloy, so certified, will have a definite, though small, expansion; assuming, however, that trituration shall be held within certain limits.

It has been contended[4] that the principal merit of expansion is that the restoration will exert constant pressure on the walls of the cavity, thus tending to produce, for all time, close contact between the amalgam and the tooth structure. Such a contention is untenable for the following reasons: The thermal coefficient of amalgam is approximately three times that of dentin. Even the best amalgam shows a comparatively high flow. When an amalgam restoration is subjected to heat, it will expand considerably more than the dentin in which it is confined, and, therefore, stress would be exerted on the walls of the cavity. Under these conditions, amalgam will tend to flow until a state of equilibrium is brought about. This will result in the restoration's being no longer in perfect contact with the cavosurface, after both the restoration and tooth have assumed mouth temperature.

Nearly 20 years ago, I made the following experiment: steel dies, with a circular cavity of approximately 4.5 mm. in diameter and 3 mm. in depth, were filled with amalgam. Many of these fillings, when subjected to a pressure of 125 pounds per square inch (psi) with a special apparatus (Fig. 1), showed no leakage. A number of dies containing restorations were immersed in water at 120° F. for five minutes. When cooled to room temperature, every one of them leaked badly. It would seem that the only logical explanation of this phenomenon is that these restorations were permanently deformed by the stress which was exerted on the walls of the steel

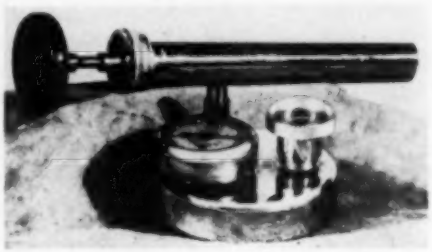


Fig. 1 • Apparatus, designed by the author, the purpose of which is to subject restorations to air pressure, which is believed to be the best method for testing adaptation of filling materials. Any restoration that will meet requirements of this test must necessarily have been correctly inserted

cavity. It is my belief that, owing to the flow of dental amalgam, it is entirely impossible for a restoration to exert continual pressure on the cavosurface, whether this pressure is caused by setting expansion, thermal expansion or a combination of the two.

The objective in placing an amalgam restoration is to get the amalgam in the closest possible physical contact with the cavosurface, to remove as much of the excess mercury as possible and to produce the highest possible density in the restoration.

The following four methods have been recommended for the introduction of amalgam into the cavity: (1) Harper's method, using condensers with a rounded face, with a rotary burnishing movement; (2) hand condensation, using flat faced condensers of a size and shape suitable for the various types of restorations; (3) mallet condensation, which may be done with the hand mallet, a mechanical mallet, propelled by a dental engine, or the pneumatic mallet, and (4) condensation by vibration, combined with digital pressure. Effects of various condensation technics are shown in Figures 2, 3 and 4.

4. Skinner, E. W. Science of dental materials, ed. 3. Philadelphia, W. B. Saunders Co., 1946, p. 305.

Burnishing Technic • A burnishing technic (Harper's method) is objectionable for the reason that the amalgam is subjected to a great deal of further trituration in the cavity. Experiments which I conducted proved that amalgam made with a good certified alloy invariably showed considerable shrinkage when the Harper method was used (Fig. 5).

In another experiment in which steel dies were filled with a burnishing technic, the following result was secured. The restorations invariably resisted air pressure immediately after packing. After the lapse of 24 hours, all restorations leaked badly. This tends to show that the initial seal was made by mercury or amalgam that was too rich in mercury. This seal did not endure after the amalgam was set. It is also believed that the burnishing technic tends to bring excess mercury to the periphery of the restoration. For these

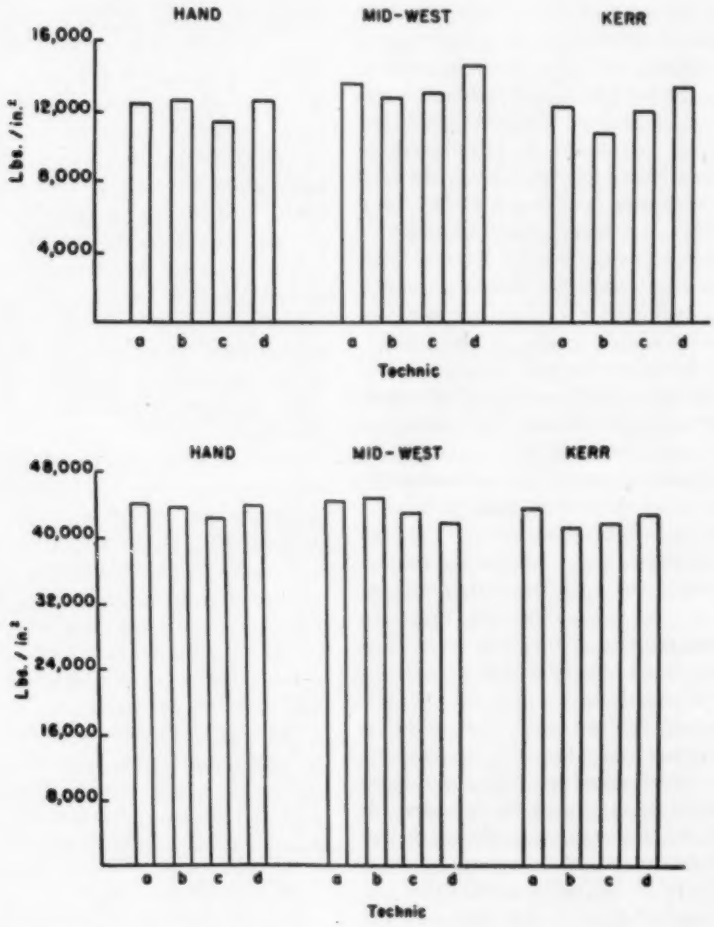


Fig. 2 • Above: Effects of various condensation technics on one hour compressive strength of amalgam. Below: Effects of various condensation technics on 24 hour strength of amalgam. (Courtesy of M. L. Swartz and R. W. Phillips)

reasons, the burnishing technic will not receive further attention in this paper.

Hand Technic • Condensation by digital pressure is a method which was used almost exclusively in the past and is still deservedly popular. During extensive research, I tested three methods of condensation—by burnishing, digital pressure and mallet. Apparatus for the vibrating technic was not available then (1933-1940). Many specimens were produced by using digital pressure which, from the standpoint of volume change, compressive strength and flow, were equal to any specimens produced by mallet condensation. The results secured by my co-workers in the department of research at the University of Southern California substantiate the results of my previous research. Sweeney[5,6] reported an increase

5. Sweeney, J. T. Uncontrolled variables in amalgam, with significant improvements in the making of restorations. J.A.D.A. 27:190 Feb. 1940.

6. Sweeney, J. T. Amalgam manipulation: manual vs. mechanical aids. Part II. Comparison of clinical applications. J.A.D.A. 27:1940 Dec. 1940.

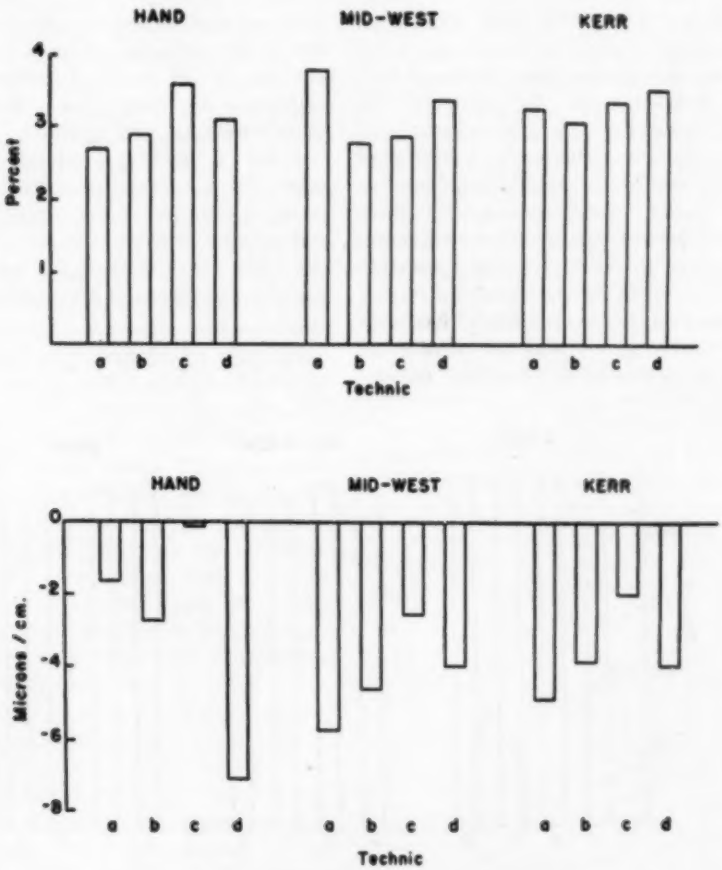


Fig. 3 • Above: Effects of various condensation technics on flow. Below: Dimensional changes produced by various technics. (Courtesy of M. L. Swartz and R. W. Phillips)

in compressive strength of 50 per cent and in tensile strength of 100 per cent when the pneumatic mallet was used. His results are widely variant from those secured by other investigators.

Mallet Technic • Mallet condensation gives results which are equal, but not superior to, those secured by good technicians using digital pressure. It would seem, therefore, that the method used should be the one preferred by the operator or the one which makes for the greatest efficiency.

Vibration Technic • To date I have not tested condensation by electromagnetic and mechanical vibration, combined with digital pressure, but, judging from the results secured by other investigators of unquestioned competence, it would seem that this method is capable of producing good results. Some investigators have shown, however, that specimens are somewhat prone to show shrinkage, probably due to overworking the amalgam during condensation. A research study[7] has been made which shows that the results secured by mechanical vibration are superior to those obtained by digital pressure. In view of the fact that the results obtained by investigators using a mechanical vibrator are little, if any, better than those obtained by investigators using digital pressure, it seems logical that the digital technic used in this research study left much to be desired.

PLACING THE RESTORATION IN THE PREPARED CAVITY

If a satisfactory amalgam restoration is to be made, the operator must be well grounded in every step of the technic. He must understand the physical properties of the material, thereby taking advantage of all its good properties and compensating, insofar as is possible, for those which are undesirable.

From a technical standpoint, this paper is concerned only with the placing of the restoration in the prepared cavity, and detailed instruction in cavity preparation, the adjustment of the rubber dam and the placement of the matrix will not

7. Ryge, G., and others. Dental amalgam: the effect of mechanical condensation on some physical properties. J.A.D.A. 45:269 Sept. 1952.

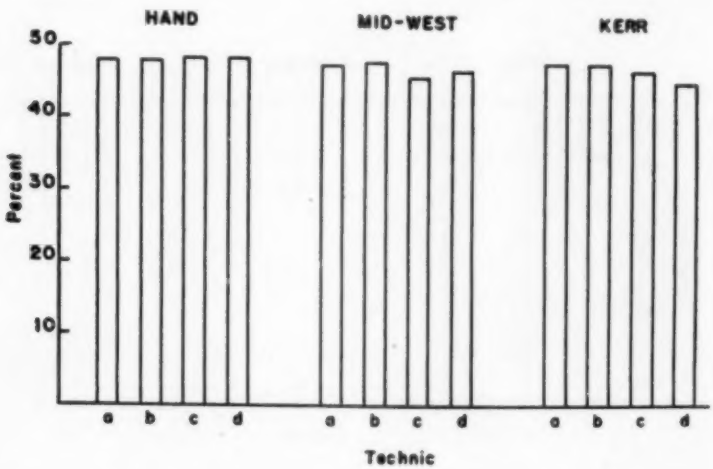


Fig. 4 • Differences in mercury content among specimens packed in various ways. (Courtesy of M. L. Swartz and R. W. Phillips)

be given. After the rubber dam has been placed, a cavity has been prepared properly and an unyielding anatomical matrix has been adjusted, suitable condensers for the operation should be selected. The amounts of alloy and mercury should be proportioned by using a balance. It makes for efficiency, however, to weigh out the alloy and mercury in advance; the proportioned materials may be placed in a gelatin capsule, the alloy and mercury being separated with a pledget of cotton. Amalgamation may be done by a suitable mortar and pestle or by one of the several mechanical amalgamators which are on the market. It is my opinion that the mortar and pestle will give results superior to those produced by mechanical devices. The effects of the use of a mortar and pestle and a mechanical amalgamator on the expansion, flow and crushing strength of dental amalgam are shown in Tables 1 and 2.

In the latter part of the 1930's I developed the so-called visual technic of amalgamation. In this technic, a correctly ground mortar and pestle must be used. To maintain their efficiency, they must be frequently reground using wet double fine carborundum powder. The alloy and mercury are put in the mortar, and trituration is started, with light pressure being used on the pestle, which is held with a pen grip. When amalgamation has proceeded to the point that the mass has a silver-gray appearance and shows a noticeable tendency to climb the walls of the mortar, trituration is discontinued. The amalgam is definitely undertriturated. It is placed on a piece of clean rubber dam, the dam is folded over the mass, and amalgamation is continued by mulling between the thumb and forefinger. Mulling should be stopped before all crepitus disappears. It is possible with this method easily to produce mixes which are so alike that there will be practically no difference in the expansion curves between various specimens. Not only is this a simple technic, but it is also one which is easily taught and requires only a minimum of skill.

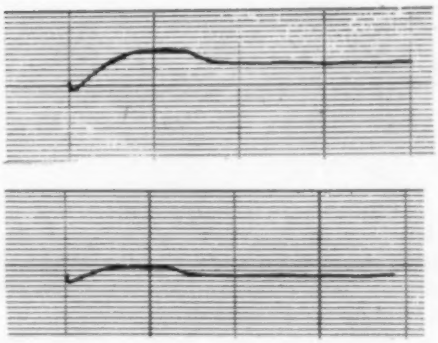


Fig. 5 • Effect of burnishing technic (Harper's method) on contraction and expansion of amalgam. Above: Test specimen no. 1 was mixed 45 seconds in S.S. White no. 8 mortar and pestle and packed with flat faced condensers without burnishing. Test was begun seven minutes after starting of mix. Below: Test specimen no. 2 was mixed in the same way. Pacing was done with round faced condensers by burnishing. Test was begun seven minutes after starting of mix

When the mixing has been completed, the material may be rolled into a rope, approximately ⅛ inch in diameter, using a clean squeeze cloth and never allowing it to come into contact with the fingers. The rope is then divided into segments of suitable size. The restoration should be started by using a small piece of amalgam from which the free mercury has been only partially removed. A large flat faced condenser should be used in the initial condensation, as condensers of small

Fig. 6 • Use of diamond condenser in adapting and condensing amalgam in the angular portions of cavity

Fig. 7 • Marginal failure caused by leaving overhang of amalgam during finishing

diameter will merely be pushed through the soft amalgam and will produce practically no condensation. Condensers which conform to the shape of the cavity should not be used. Condensation is started with a large condenser, using a heavy thrust. This will facilitate removal of the free mercury. The free mercury which accumulates on the surface may be removed from the cavity by compressed air or a pledget of cotton. After initial condensation has been carried out, condensation is completed with a condenser of smaller diameter by starting at the center of the mass and working toward the periphery. Every bit of the amalgam must be contacted and thoroughly condensed. The diamond condenser is used to carry the amalgam into all angles, where it is thoroughly condensed and excess mercury is removed (Fig. 6). Another piece of amalgam is placed in the squeeze cloth, and most of the free mercury is removed. Then it is placed in the cavity and condensed, using the previously described technic. The restoration is built layer by layer until the cavity is overfilled. The surface of the restoration will show some excess of free mercury and amalgam that is too rich in mercury. The remaining portion of the amalgam is then placed in the squeeze cloth and all possible excess mercury is removed. The mass of dry amalgam is then placed on the surface of the restoration and condensed thoroughly, using a heavy thrust. This will absorb the free mercury on the surface. If, at any time, the residue of amalgam shows signs of crystallizing and becoming refractory, another mix must be made for the completion of the restoration. Never, under any condition, should partially crystallized amalgam be replasticized and used.

With this technic, the amalgam will set rapidly, and carving can be commenced almost immediately. The occlusal surface can be roughly formed while the matrix is in position. The matrix is removed by slipping it out from the lingual to buccal (a pledget of cotton held tightly against the occlusoproximal portion of the restoration will prevent fracture of the amalgam during the removal of the matrix). Suitable sharp carving instruments are used to produce anatomical form of the restoration. Axial and gingival margins are examined carefully, and all excess amalgam is removed. The rubber dam is then removed, occlusion is tested, and the patient is dismissed. From 24 to 48 hours should elapse before polishing is attempted.

In polishing and finishing the following technic is used: Fine cuttle strips are used in polishing the gingival margin.

Table 1 • Expansion and flow comparison with amalgamator and mortar and pestle*

Alloy	Expansion†		Flow, %	
	No. 1‡	No. 2‡	No. 1‡	No. 2‡
A	− 5.25	− 1.1	2.75	2.62
B	− 2.25	+ 0.6	3.9	2.42
C	+ 0.75	+ 0.6	3.8	6.5
D	− 2.0	+ 6.4	6.0	4.3
E	− 4.25	− 2.25	1.6	2.3
F	− 5.0	− 5.3	7.12	3.9
G	+ 0.75	+ 6.0	3.5	2.62
H	− 5.75	+ 5.9	5.2	4.6
I	+ 5.25	+10.6	5.45	2.9
J	0	+ 5.2	3.4	2.0
K	− 1.5	+ 4.0	3.0	2.6
L	+ 0.25	+ 6.1	4.0	3.0
M	− 2.0	− 0.5	3.75	2.2
N	−18.0	− 7.8	4.2	2.2
O	− 2.0	+ 3.4	2.8	2.5
P	− 0.5	+ 4.6	2.1	1.52
Q	− 0.5	+ 2.0	2.9	2.25
R	− 3.0	+ 3.1	2.8	3.0
S	+ 8.8	+10.0	4.0	3.7
T	− 0.25	+ 5.2	4.7	3.48

*All specimens packed by hand.
†Microns per centimeter.
‡No. 1: Mechanical amalgamator with steel pestle. No. 2: Mortar and pestle by manufacturer's directions.
(Courtesy of R. W. Phillips)

Table 2 • Crushing strength comparison with amalgamator and mortar and pestle*

Alloy	Crushing strength			
	1 hour		24 hour	
	No. 1†	No. 2†	No. 1†	No. 2†
A	11,400	10,000	47,500	43,800
B	16,900	16,400	48,700	50,700
C	17,400	17,600	50,900	48,900
D	13,000	11,100	48,600	48,400
E	9,300	11,700	45,900	44,800
F	8,900	8,800	42,300	40,100
G	17,900	16,800	49,900	49,100
H	11,600	10,200	49,400	42,700
I	11,900	11,400	48,100	47,000
J	16,000	15,200	50,800	44,800
K	11,800	12,600	46,500	43,700
L	11,600	10,300	45,600	43,900
M	18,000	16,700	48,100	49,000
N	12,600	11,200	53,000	47,900
O	9,300	8,700	44,000	42,000
P	11,000	13,500	49,800	48,500
Q	13,200	12,000	46,000	48,500
R	10,900	8,900	51,900	46,700
S	11,600	11,700	49,400	43,900
T	15,800	13,000	49,800	44,100

*All specimens packed by hand.
†No. 1: Mechanical amalgamator with steel pestle. No. 2: Mortar and pestle by manufacturer's directions. (Courtesy of R. W. Phillips)

Cuttle disks are used for polishing the axial margins. All overhang must be removed from occlusal margins with fine stones or finishing burs. Figure 7 shows marginal failure caused by leaving an overhang. Polishing of the occlusal surface is done with soft brushes charged with wet pumice. Great care must be used to avoid overheating. A high polish is produced by using a soft brush charged with wet chalk or tin oxide.

SUMMARY AND CONCLUSIONS

To date, the perfect dental restoration has not been made.

Amalgam, in spite of its many undesirable physical properties, has proved to be a very valuable material, capable of producing superior results when properly manipulated. The physical properties of amalgam must be understood, so that the most can be made of its desirable ones and the effect of its undesirable ones compensated for as far as possible.

Every procedure in the making of an amalgam restoration must be carried out with skill and precision. Several methods have been advocated for condensation of amalgam. The burnishing technic (Harper's method) is inadequate for the reasons given previously in this paper. Condensation by digital pressure and by pneumatic and mechanical mallets gives results which are good and almost identical. Condensation by mechanical or electromagnetic vibrators, combined with digital pressure, judging from results that have been achieved, has proved satisfactory with the exception that shrinkage is usually produced.

Scientists • When a white-robed scientist, momentarily looking away from his microscope or his cyclotron, makes some pronouncement for the general public, he may not be understood, but at least he is certain to be believed. No one ever doubts what is said by a scientist. Statesmen, industrialists, ministers of religion, civic leaders and philosophers, all are questioned and criticized, but scientists never. Scientists are exalted human beings who stand at the very topmost pinnacle of popular prestige for they alone have the monopoly of the formula: "It has been scientifically proved . . ." which appears to rule out all possibility of disagreement. *Anthony Standen. Science Is a Sacred Cow.*

Important considerations in the removal of teeth

James J. Ivory, D.D.S., Staten Island, N. Y.

The removal of teeth is the oldest and most common of all surgical procedures and in recent years many refinements in this technic have taken place. The principal contributions to dentistry's present-day efficiency have been greater variety and knowledge of anesthetics, high degree of asepsis, use of antibiotics, simplification of roentgen-ray technic, development of more anatomically correct instruments and recognition of a closer relation between oral pathologic conditions and systemic disease.

A dentist should possess good working knowledge of stomatological manifestations of systemic disease, ability to recognize the abnormal and willingness to seek consultation.

The number of serious complications and fatalities are relatively small in the removal of teeth. Like any other operation, however, it may be attended by shock, hemorrhage and infection. When extractions are necessary, the first consideration is to gain the confidence of the patient. Most people fear operations, and all possible courtesy, tact and sympathy should be exercised to dispel apprehensiveness and to insure comfort. The dentist should listen attentively as the patient describes the symptoms, and obtain such necessary information as date of onset, duration, severity, and any history relevant to the complaint.

In order to arrive at an accurate diagnosis, complete clinical and roentgenographic examinations of the mouth should be made. Any other tests which might be helpful, such as percussion, vitality determination, transillumination, biopsy, smears, cultures, sensitivity, blood, urine and sedimentation rate, should also be made.

If the physical condition of the patient is known to be unsatisfactory, or if the history arouses suspicion, the dentist should always consult the patient's physician, who will cooperate and also share the responsibility in hazardous conditions. Removal of teeth for patients with hypertension, hemophilia, blood dyscrasias, nutritional abnormalities, jaundice or acute rheumatic fever requires individual evaluation. It is also contraindicated to remove teeth during and for at least two years after irradiation.

Patients known to have a cardiac disease and who are in poor condition are generally under the care of a physician; his judgment of the patient's reserve should be the determining factor in all operative procedures.

SUITABLE ANESTHESIA

There is considerable difference of opinion as to the best type of anesthetic. When the diagnosis has been established and the physical condition ascertained, the

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type of anesthetic most suitable for both patient and operator is selected. The objective in every instance is complete anesthesia with a high degree of safety, and a satisfied patient.

The technic of local anesthesia is standardized, and most dentists are adept in its administration. Its comparative safety and the rarity of serious complications render it universally favored. In some practices, however, a knowledge of local anesthesia alone is not sufficient. A basic understanding of general anesthesia is necessary in an oral surgery practice.

General anesthesia is especially desirable and sometimes mandatory in the following circumstances:

1. When diffuse oral infection prevails and the passage of the needle may carry the infection into the contiguous soft tissues, the bone, or even the blood stream.
2. When the inflammatory process renders a local anesthetic ineffective, as in active pericementitis.
3. When dealing with recalcitrant children and highly nervous and noncooperative adults.
4. When treating acute dentoalveolar abscesses.
5. When a number of teeth are to be removed at the same time.
6. When there is a history of idiosyncrasy to procaine.

General anesthesia without intubation is contraindicated when life may be endangered by asphyxiation, as in brawny swellings of the neck, edema of the glottis and tongue, any embarrassment of respiration causing dyspnea or cyanosis, or in the presence of a parapharyngeal or a peritonsillar abscess when pus may be inspired.

Alcoholics should also be given special consideration, as they are difficult subjects for anesthesia even when they have received premedication.

In the dental office the general anesthetic of choice is nitrous oxide-oxygen with trichloroethylene. This mixture's comparative safety makes it adaptable for the patient who comes for treatment without preparation and expects to be comfortable and ambulatory immediately after operation. Premedication may be used to allay fear and apprehensiveness prior to the use of either local or general anesthesia if the patient is accompanied by another person to and from the office.

Intravenous anesthesia has recently come into favor for oral surgical procedures in the dental office. Its use should be accompanied by the usual consideration accorded any general anesthetic agent, and should be administered with precision based on a thorough knowledge of its limitations and contraindications. Because of its powerful action, preliminary sedation may be omitted.

OPERATIVE PROCEDURE

In every instance the operative procedure must be carefully and thoroughly planned, and must be based on the following factors:

1. The formation, divergency and anomalies of the roots.
2. The presence of fusion or hypercementosis.
3. The condition and deflection of the crown.
4. The amount of overlying bone.
5. The proximity of the tooth to important structures such as the antrum, floor of the nose, mental foramen, or the mandibular canal.

Where there is extensive destruction of bone, or weakened bone which may result in a fracture, or where the antrum may be exposed or paresthesia produced during the procedure, the patient or his close relative should always be tactfully advised in advance of the possible complications.

There is still considerable difference of opinion as to how few or how many teeth should be removed at one time. Those who operate under general anes-

thesia usually prefer to remove all the teeth at one time. Removal of teeth in only one part of the mouth is advocated more often when conductive or infiltration anesthesia is employed. There is no accurate method of predetermining a patient's resistance to shock or infection; therefore, the amount of surgery which may be accomplished safely at one time must be based on experienced judgment and conservative management.

In instances of focal infection with intense constitutional symptoms such as are found in acute, infective rheumatoid arthritis, caution should be exercised, as the removal of many teeth at one time may result in an overwhelming infection of the blood stream. These patients should receive a combination of antibiotics as a preventive measure, as do persons with a history of rheumatic fever or bacterial endocarditis.

TECHNIC

The operative technic selected for the patient is based on individual choice. Some prefer the impactor for the excision of bone, others the mallet and chisel or the surgical bur. The results obtained vary with the skill of the operator.

The operating position at the chair is also a matter of individual preference. Good illumination and clear vision, together with proper retraction and the use of an efficient aspirator, are essential for a successful result. An operator should have competent assistants to aid him in meeting any complexities. Situations beyond the ability of the operator should never knowingly be undertaken.

Sterility of all instruments, towels and dry dressings should be maintained conscientiously, and the field of operation rendered as nearly sterile as possible. Regardless of the anesthetic, throat packs should be used for complete protection of the airway from the entrance of foreign bodies.

In all surgical procedures the most favorable results are obtained where the amount of trauma is minimized. Therefore, whether teeth are removed with forceps or elevators, or a combination of both, the least amount of manipulation is the most important consideration. The thumb and index finger of the operator should be placed in position to protect the other teeth, the tongue, floor of the mouth, lips and cheeks from injury. In the removal of lower teeth the mandible should be given support to prevent stretching of the temporomandibular ligaments.

It is good practice first to cut through the interproximal papillae with a scalpel and with a periosteal elevator deflect the soft tissues buccally and lingually down to the bone. This permits the beaks of the forceps to engage the root portion and also prevents laceration of the soft tissue.

Elevators may be effective in the removal of roots and teeth and in helping break the attachment of the tooth to the socket before the application of forceps. The bone, not the adjacent teeth, should be used as a fulcrum. In the removal of fractured roots of deciduous teeth with elevators, the possibility of injury to the underlying permanent teeth or buds is ever present.

Forceps should conform to the anatomy of the tooth to be removed, and the beaks always kept in alignment with its long axis. The lingual beak is brought into position first, then the buccal, and the forceps are closed with a firm grip. Pressure is applied gradually but deliberately in the direction of least resistance, and the tooth luxated until loosened sufficiently to be delivered by traction. Quick, jerky movements usually cause fracture of the root or splintering of the alveolus. Any tooth which resists the average amount of pressure should not be forced, but the unyielding bone should be removed at the point of resistance.

When a tooth is fractured below the bone line, the removal of the root or roots can be accomplished in many in-

stances by working within the socket. It is often necessary, however, to remove some or even all the labial or buccal plate, especially where hypercementosis exists. Best results are achieved when all loose bone is removed, the sharp process clipped with a rongeur forceps and smoothed with a bone file. The soft tissue should be trimmed and sutured where necessary.

The Crane pick is valuable in the removal of lower molars with divergent roots where the crown is either frail or fractured below the bone line. The point of the instrument is forced down into the bifurcation and the roots separated and removed individually with right and left spoon elevators.

When an upper molar root has been fractured, and the apex is in close proximity to the floor of the maxillary sinus, care should be exercised to prevent it from being forced into this cavity. If, however, a root enters the antrum, it is better to elevate the buccal mucoperiosteum and make a window above the apexes than to try to enlarge the socket on the crest of the ridge. The root may be removed with the help of the aspirator, or an antral curet, and the flap sutured back into place.

POSTOPERATIVE PROCEDURE

Considering the great number of teeth extracted, the incidence of postoperative hemorrhage is relatively small. This is perhaps due to the fact that patients with previous history of hemorrhage, or those taking anticoagulant drugs, make it known, and their coagulation and bleeding time are determined prior to operation. Chronic inflammatory and unhealthy granulation tissue, found principally in periodontal disease, has a tendency to bleed profusely if not completely removed. Bleeding can usually be controlled by having the patient bite hard on a piece of gauze until coagulation sets in. Many times, however, it becomes necessary to apply an astringent such as Monsel's solution, or to pack the socket with hemostatic cotton or gauze, or to suture the contiguous soft tissue.

If bleeding persists or secondary hemorrhage occurs, its source should be determined by cleaning out the socket while the patient is under anesthesia. Bleeding from bone can be controlled at times by crushing the bleeder with a burnisher, or by undermining the soft tissue and suturing over it. Persistent or recurrent hemorrhage may call for laboratory tests of the blood to determine the cause and treatment.

The consensus still is that a normal blood clot is the best dressing in a socket, notwithstanding the favorable reports obtained from the use of sulfanilamides and antibiotics. The cause of the painful or so-called "dry socket" is a result of the loss of the normal blood clot. If such a condition exists, the debris is removed by irrigation or aspiration, and the socket dried. Then a thick paste of pulverized sulphathiazole and eugenol is packed gently into the socket and replaced every 24 hours until pain subsides.

An ice bag, if applied within the first few hours after operation, may minimize pain and swelling; moist heat is more effective, however, in reducing the brawny swellings associated with fulminating infections and postoperative edema and ecchymosis. Hyaluronidase is currently being used with questionable success for the relief of edema and trismus sometimes associated with the removal of difficult impacted lower third molars.

The home treatment should be explained clearly and carefully to the patient after the operation. Some practitioners give printed instructions so that the advice will not be forgotten or misunderstood.

Medical Arts Building

A comparative clinical evaluation of some commonly used local anesthetic compounds

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Within the past several years many new local anesthetic agents have been introduced into dental practice. Some of these compounds have been reported extensively in the literature.[1-5] Others have gained widespread clinical use even though animal tests and human clinical results for these drugs have appeared in the dental literature in somewhat limited numbers.

Animal tests for local anesthetic potency and toxicity are of great importance before clinical use of these agents may be advocated. Animal work, however, must be corroborated by extensive clinical testing on human patients before conclusions may be reached which have significance for the practitioner of general dentistry. Both Mumford and Geddes[6] and Epstein and co-workers[7] emphasize the limitations of animal experimentation by referring to the species differences in enzyme patterns which give rise to widely different rates of hydrolysis and detoxification of the different local anesthetics.

Confirmation of previous observations and comparisons in clinical performance of these newer compounds can be gained by objective clinical studies. Clinical comparisons in effectiveness generally have been made between 2 per cent procaine control solution and only one or two of the newer solutions. These determinations usually have not been concerned with any possible differences between infiltrative and conductive effects. The purpose of this study was to make a clinical evaluation of seven generally used products by comparing them for differences in conductive and infiltrative effects with regard to such features as potency, induction, duration, occurrence of untoward symptoms, and the effects of varying concentrations of vasoconstrictor.

The psychic implications of local anesthesia play an important part in the results obtained. Such factors as patient management, operator's skill, and operator's confidence in the solution which he is using make it difficult for objective comparisons to be made in everyday practice. Nearly every dentist has made

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1. Lazansky, J. P., and Robinson, L. Study of the effectiveness of Xylocaine as a local anesthetic agent in dentistry. Oral Surg., Oral Med., & Oral Path. 2:1286 Oct. 1949.

2. Worley, R. C. Objective comparison of several clinically used local anesthetics. Northwest Univ. Bul. 54:5 March 1954.

3. Adilman, H. B. Experimental comparison of local anesthetics in the human oral cavity. Northwest Univ. Bul. 54:10 March 1954.

4. Cowan, A. Clinical evaluation of Xylocaine anesthesia. J. D. Res. 35:824 Dec. 1956.

5. Tullar, P. E. Toxicity studies with six local anesthetics. (Abst.) J. D. Res. 34:732 Oct. 1955.

6. Mumford, J. M., and Geddes, I. C. Planning of a clinical trial of local anesthetics in dentistry. Brit. D. J. 98:200 March 15, 1955.

7. Epstein, E.; Meyer, M., and Ginsberg, H. Experimental toxicity and local anesthetic activity of alkyl aminoethyl esters of meta-amino alkoxy benzoates. Current Res. Anesth. 34:171 May-June 1955.

his own subjective appraisal of the effectiveness of various compounds which he has used. This accounts for the differences in popularity of the various solutions among the practitioners who are using them.

Sherman and co-workers[8] point out the differences in results obtained by two operators in a study which they conducted. In order to make this present study as representative as possible of results which could be obtained by a cross section of practitioners, 60 dental students participated in making the injections from which the data were obtained. This project was large enough to gain equal distribution for all the participants, and the information recorded came from 3,703 successive injections made for adult patients during a period of 13 months.

METHODS AND MATERIALS

The following local anesthetic compounds were evaluated:

Solution I: Procaine hydrochloride 2 per cent with epinephrine 1:60,000.

Solution II: Xylocaine hydrochloride 2 per cent with epinephrine 1:50,000. (Alpha-diethylamino-2, 6-acetoxylidide hydrochloride.) Brand of lidocaine hydrochloride.

Solution III: Xylocaine hydrochloride 2 per cent with epinephrine 1:100,000.

Solution IV: Primacaine hydrochloride 1.5 per cent with epinephrine 1:60,000. (2′-diethylaminoethyl 2-butoxy-3-aminobenzoate hydrochloride.) Brand of metabutoxycaine hydrochloride.

Solution V: Primacaine hydrochloride 1.5 per cent with epinephrine 1:125,000.

Solution VI: Ravocaine hydrochloride 0.4 per cent. (2′-diethylaminoethyl 2-propoxy-4-aminobenzoate hydrochloride.) Brand of propoxycaine hydrochloride. With Novocain 2 per cent, brand of procaine hydrochloride, and Levophed 1:30,000, brand of levarterenol.

Solution VII: Novocain 2 per cent, with Pontocaine hydrochloride 0.15 per cent, (2′-dimethylaminoethyl 4-butylaminobenzoate hydrochloride) brand of tetracaine hydrochloride, and Cobefrin 1:10,000, brand of nordefrin.

These seven test solutions were issued at random from a central dispensary and were identified only by a code in which the identifying digit was placed in a certain location in a varying four digit number. None of the operators knew the identity of the compound being used when he received a prepared syringe. In an immediately preceding study involving the same operators, repackaged ampules were used and the operators were notified that types of closure and color of plungers would not serve to identify the solutions tested. The commercial tubes were not repackaged for this present study but the operators were not aware of this change in procedure. The printing on the individual tubes was eradicated, and the student operators who had no previous opportunity to become familiar with tube brand characteristics proceeded on the assumption that all test solutions had been repackaged.

The dental assistant issuing the solutions maintained a record so that each solution was distributed equally to all operators. All the operators taking part in the study were briefed before the project began and injection technics and recording of data were standardized as much as possible.

The solutions used were purchased on the open market, and the concentrations of both anesthetics and vasoconstrictors for purposes of this study were the concentrations indicated by the manufacturer. The record filled out for each injection is shown. The injections were for

8. Sherman, H.; Fiasconaro, J. E., and Chilton, N. W. Comparison of the clinical effectiveness of the higher potency local anesthetics in operative dentistry. J.A.D.A. 48:151 Feb. 1954.

routine procedures in operative dentistry and crown and bridgework in the clinic. It is commonly agreed that the demands on local anesthesia are greater for cutting procedures on the teeth than for oral surgery where, in many instances, only soft tissue anesthesia may be adequate.[9]

RESULTS

Induction Time • Induction time was determined by recording the time the injection was begun and then noting the lapse of time before cutting procedures in the dentin could be accomplished without pain. Uniformity of technic was achieved by having the operators take an entire minute for injecting the solution. The reliability of patients orally reporting the symptoms of successful anesthesia was found to be unsatisfactory because, in most instances, soft tissue anesthesia was evidenced shortly after withdrawal of the needle. Testing with the rotating bur, however, proved to be another matter and satisfactory anesthesia was not as quickly manifested as has been reported in other studies.[4, 10]

It was found that the best comparison between solutions could be made by calculating the percentage of injections which gave satisfactory operative anesthesia in less than five minutes or more than five minutes. This was actually four minutes after withdrawal of the needle.

The results from 3,061 injections may be noted in Table 1. The results for mandibular (conductive) anesthesia were recorded separately from maxillary (infiltrative) anesthesia, and differences in the rapidity of onset are apparent when comparing the maxillary and mandibular effects. In general, it may be seen that the induction time with the conductive anesthesia was longer than when infiltration anesthesia was used. This

9. Tainter, M. L.; Wessinger, G. D., and Lee, J. W. New local anesthetic solutions containing propoxycaine. J.A.D.A. 51:19 July 1955.

10. Dubin, N. L., and Foner, L. M. Xylocaine. A report of 3,000 clinical cases. Oral Surg., Oral Med., & Oral Path. 5:403 April 1952.

University of Nebraska
College of Dentistry

Patient_____ Cartridge Code No._____ Time injection made_____

Student_____ Type of injection_____ Volume_____ Tooth_____

Operation_____ Induction Time_____

Grade of Anesthesia: A. Complete elimination of pain
B. Some pain but not sufficient for re-injection
C. Injection had to be repeated
(1) Second injection successful or unsuccessful
(2) Third injection successful or unsuccessful

Duration of anesthesia (post card)_____ Date_____

Remarks: Untoward symptoms (tremor, nervousness, fainting)
Patients subjective appraisal. Paresthesia but not anesthesia

Record form kept for all injections

Table 1 • Record of induction time for all injections. Time required in minutes for anesthesia to manifest itself completely as evidenced by lack of response to the bur rotating in dentin

Maxillary			Mandibular		
Solution	Less than 5 min.	More than 5 min.	Solution	Less than 5 min.	More than 5 min.
V (215 inj.)	68.3%	31.7%	V (133 inj.)	67.0%	33.0%
II (526 inj.)	60.0%	40.0%	IV (163 inj.)	60.1%	39.9%
I (201 inj.)	59.2%	40.8%	II (204 inj.)	57.3%	42.7%
VI (223 inj.)	58.3%	41.7%	I (216 inj.)	48.6%	51.4%
IV (228 inj.)	57.0%	43.0%	VI (173 inj.)	46.8%	53.2%
III (197 inj.)	49.2%	50.8%	VII (238 inj.)	37.0%	63.0%
VII (163 inj.)	47.8%	52.2%	III (181 inj.)	36.0%	64.0%

agrees with the observations of Sherman and others,[8] although the order of individual ranking of the compounds was found to be a little different from that which they reported.

Potency • The depth of anesthesia, or potency, was reported as Grade A, B, or C, a method which has been used by most clinical investigators. Grade A indicated complete elimination of pulpal pain during operative procedures and Grade B was recorded when some pain was reported by the patient, but was not sufficient to require a second injection. Grade C meant that the injection had to be repeated. A record also was kept of the success or lack of success of the second and third injections when these were required, but no conclusions were evident from these data.

Figure 1 indicates the results obtained in 2,128 maxillary injections and Figure 2 gives this information for 1,575 mandibular injections. In both figures the number of injections reported as grade A, B, and C are expressed as percentages in the graphs so that comparisons in effectiveness may be made readily. It will be noticed that the rankings of the compounds are different when comparing infiltrative and conducting results, but that in both graphs, solution II (lidocaine HCl, epinephrine 1:50,000) exhibits the greatest percentage of Grade A anesthesia.

Duration of Anesthesia • Duration of local anesthesia is of particular importance to the patient. Figure 3 shows the results determined from the 2,434 injections reported of the 3,703 in this study. Again the results are given separately for maxillary infiltration and for mandibular conductive anesthesia. The duration was calculated from the time the injection was made until all traces of soft tissue anesthesia had disappeared. Obviously, operative anesthesia did not last this long, but the sensations of local anesthesia and motor paralysis are the important considerations from the patient's point of view. This is of some significance, then, in selection of a particular anesthetic compound for a particular dental operation if the dentist is concerned about the patient's comfort and well being.

Patients who left the clinic with symptoms of anesthesia still persisting were given a stamped, self-addressed post card form, and were instructed to note the

time of disappearance of anesthetic symptoms. As these were returned by mail, the results were added to the code sheet made for each injection. Duration tabulated in hourly increments is graphically portrayed in Figure 3. Except for mandibular solution VII, it will be noted that the graphic representation is one of normal biological distribution. Recording was not made in hourly increments longer than five hours and with the injection of solution VII, many patients reported duration times of six, seven, and even eight hours. These are all represented in the line longer than five hours and account for the atypical graphic representation found for this compound.

The median was calculated as an expression of central tendency for each solution so that comparisons in duration could be made more conveniently. The solutions are ranked in the order of progressively longer median duration times.

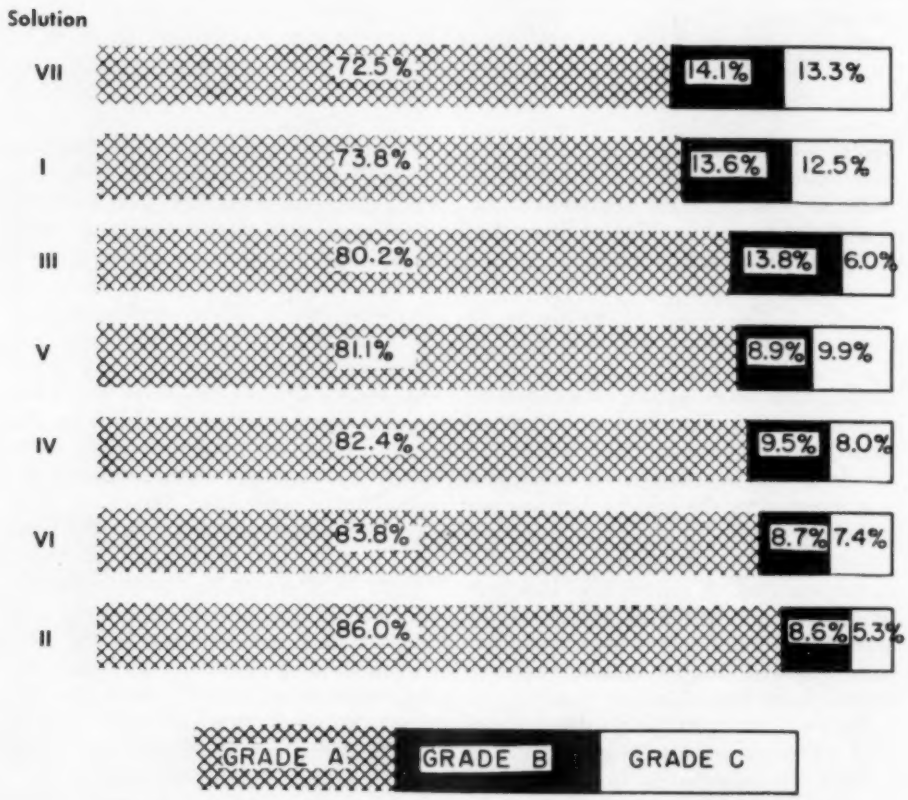

Fig. 1 • Potency of anesthesia in 2,128 maxillary injections

The Occurrence of Untoward Symptoms • The occurrence of untoward symptoms was recorded during this study in order to gain an expression of the comparative clinical safety of the compounds tested. These observations are shown in Figure 4. In none of the 3,703 instances was a serious or severe reaction noted. The most commonly encountered reactions were fainting (only a few instances), tremor, postoperative edema, nervousness, pain on injection, and headache. Maxillary and mandibular results are shown individually, and then a comparison is made including all injections. The number of untoward symptoms was so small that each added reaction makes a great difference percentagewise, therefore, a much larger study is needed to assess this factor accurately. In fact, not a single maxillary reaction was encountered with two of the solutions (III and V). Interestingly enough, with the exception of the maxillary solution VI,

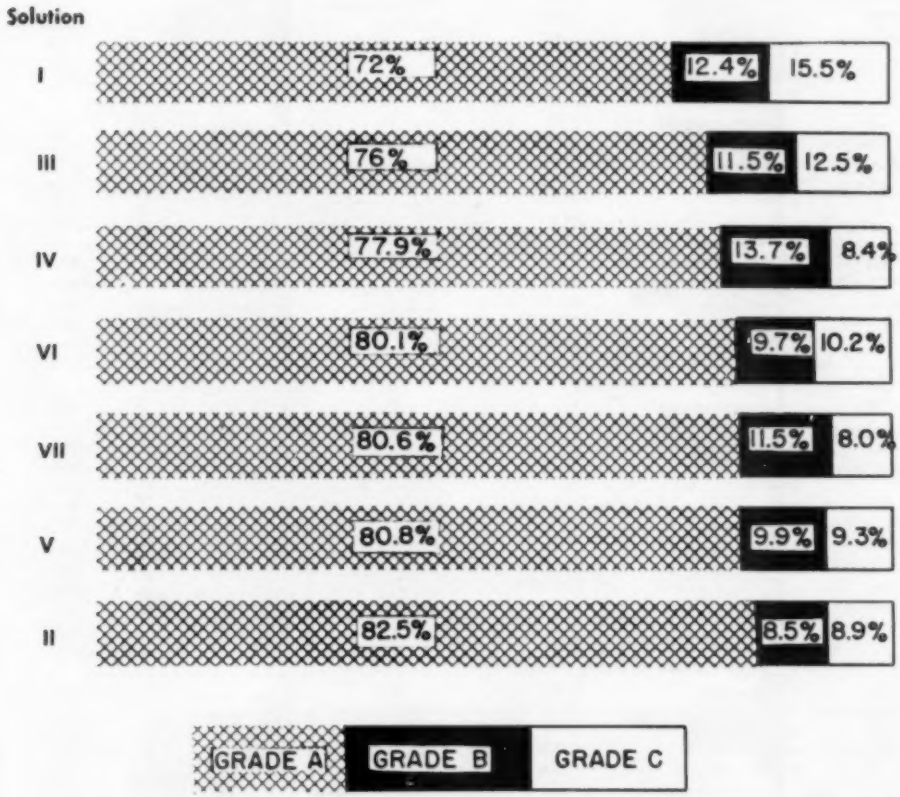

Fig. 2 • Potency of anesthesia in 1,575 mandibular injections

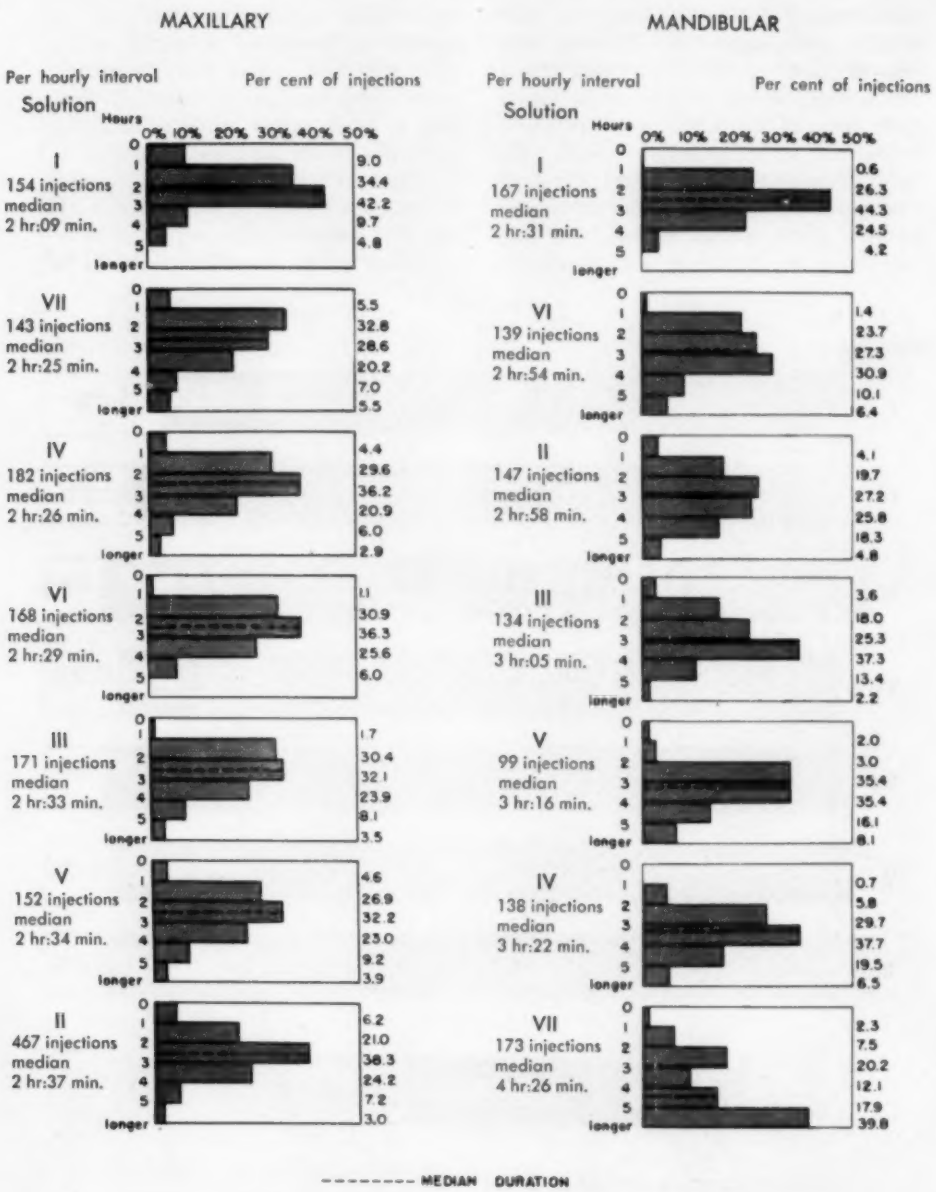

Fig. 3 • Duration of anesthesia for the 2,434 cases reported

all solutions tested exhibited fewer untoward side reactions than solution I, the 2 per cent procaine solution, which has been for so long the standard for safety in local dental anesthetic solutions.

STATISTICAL ANALYSIS

The data obtained for potency and duration were subjected to a chi-square analysis of variance. Maxillary and mandibular results were analyzed separately according to the following equation:

$$X^2 = n\left(\sum_{i.j.} \frac{n^2_{ij}}{n_i n_j} - 1 \right)$$

The information derived from this test for independence is given in Table 2.

For mandibular potency, with 12 degrees of freedom, the chi-square observed was midway between 0.05 and 0.02 of

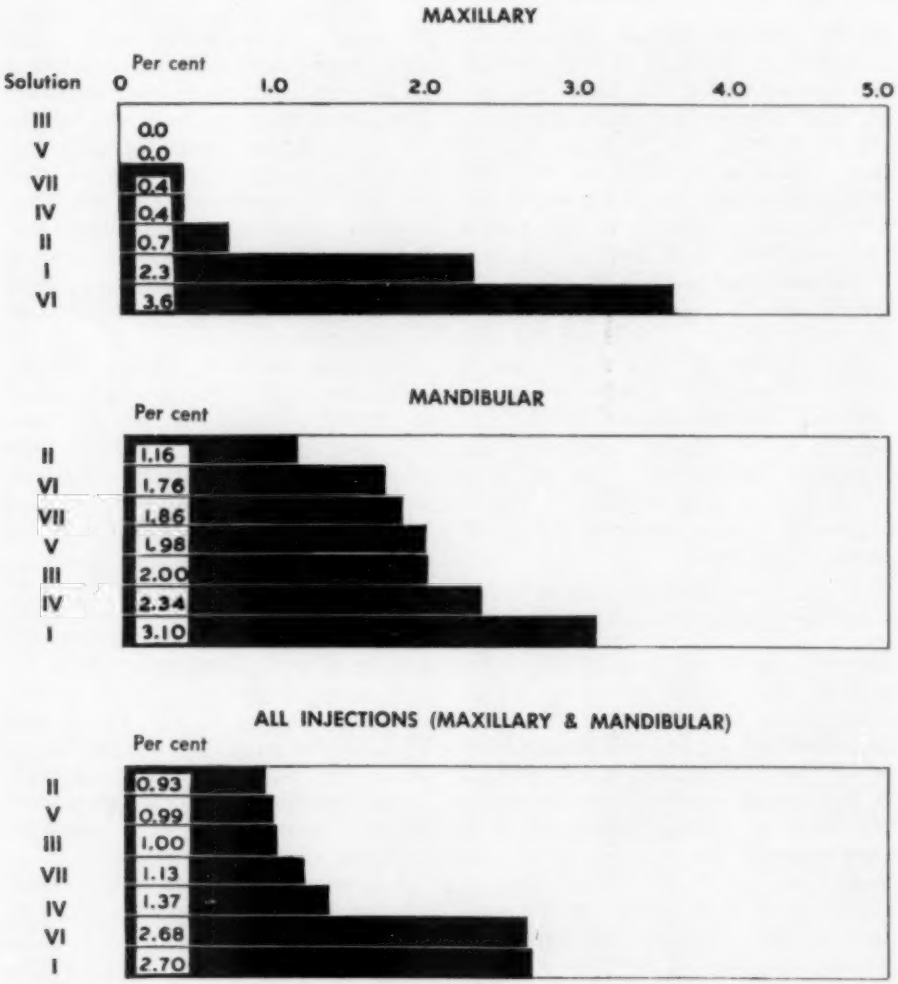

Fig. 4 • Occurrence of untoward symptoms for all injections

Table 2 • Statistical analysis of data obtained for potency and duration as tested for independence

	X^2	Degrees of freedom	X^2 .05	X^2 .02	X^2 .01
Mandibular potency	22.664	12	21.026	24.054	26.217
Mandibular duration	299.125	30	43.779		50.892
Maxillary potency	40.738	12	21.026	24.054	26.217
Maxillary duration	65.238	30	43.773		50.892

the chi-square distribution. This indicates a significance of nearly 97 per cent that the distribution for this factor was not the result of mere randomness. For mandibular duration, with 30 degrees of freedom, the chi-square observed was 299, which greatly exceeds the chi-square distribution at 0.01 which is 50. This gives a confidence value well above 99 per cent.

The maxillary potency chi-square observed, with 12 degrees of freedom, was 40, which is well in excess of the chi-square distribution value at 0.01 which is 26. The maxillary duration chi-square observed, with 30 degrees of freedom, was 65, which exceeds considerably the chi-square distribution value at 0.01, which is 50. In both instances the maxillary results have a confidence value well above 99 per cent.

DISCUSSION

Harris[11] has shown that an anesthetic solution may contain a vasoconstrictor which is too concentrated or too dilute and that there are desirable limits within which this concentration is most helpful in local dental anesthesia. In comparing the effects of varying concentrations of vasoconstrictor on induction time, the metabutoxycaine 1:125,000 solution exhibited more rapid onset than the metabutoxycaine 1:60,000 solution. The greater diffusibility of the solution having the more dilute vasoconstrictor probably accounts for this, since this solution could be expected to reach the target nerve more quickly than the solution having a greater concentration of vasoconstrictor. This factor does not hold true for the lidocaine solutions where the more concentrated vasoconstrictor does not slow the onset of anesthesia. This and other evidence in this experiment indicates that the penetrating power or diffusibility of lidocaine for dental purposes is not greatly affected by the 1:50,000 concentration of epinephrine.

Induction times for all the solutions tested seem well within practical ranges for private practice. In fact, for those induction times falling within the five minute period from time of needle insertion, many were recorded within a minute or two after withdrawal of the needle.

In evaluating depth of anesthesia, or potency, even though solution II heads the list, some of the other compounds may be properly considered within the same range of potency. In the maxilla solutions, numbers II, III, IV, V, and VI could be grouped and classified as among the more effective compounds. In the mandible a natural grouping of the more potent solutions is gained by excluding solutions I and III.

It is interesting to note that, although solution VII is the least effective com-

11. Harris, S. C. Pharmacology of local anesthetics. In report of a conference on the teaching of local anesthesiology. Sponsored by the Council on Dental Education and the Council on Dental Therapeutics, American Dental Association, March 20, 1955.

pound tested for maxillary potency, it is one of the most effective in providing mandibular anesthesia. This is probably the result of its inability to diffuse well, though it is potent in conductive anesthesia where diffusion through bone is unnecessary for the solution to reach the nerve.

Keeping in mind that the injections for this experiment were made by dental students, the relative effective potency percentages obtained here in the high eighties would in all likelihood be well into the nineties in the hands of the experienced practitioner with his greater technical skill in injection, assurance, ability in patient management, and deftness in operation. The lower percentages obtained for mandibular anesthesia are undoubtedly a reflection of the increased difficulty in depositing the solution exactly on the target nerve in the case of conductive anesthesia. This study indicates that with certain solutions, comparative potency in infiltrative and conductive anesthesia is not necessarily the same, and that each solution must be evaluated for its effectiveness in each type of local anesthesia. It also shows that changes, within limits, in the amounts of vasoconstrictor may or may not have a definite effect on the performance of the anesthetic, depending on the characteristics of the particular anesthetic compound. Changes in vasoconstrictor strength do not always make predictable the changes in anesthetic behavior, and each solution must be evaluated on its own merits because factors other than the mere changing of vasoconstrictor dilution apparently are important.

Duration of an anesthetic compound cannot be individually predicted for a particular patient as evidenced by the distribution exhibited in Figure 3. The comparisons which can be made between the median durations of different solutions should be helpful, however, to the operator in selecting an anesthetic agent for a particular situation. In maxillary infiltration it is noted that the median durations for all solutions tested, except solution I, fall within a range of 12 minutes. In the mandible the range of duration is considerably greater and it is here that the practitioner's individual prescription becomes more important, particularly in view of the fact that the facial sensory effects of conductive anesthesia are more unpleasant to the patient.

The relatively low occurrence of untoward symptoms indicates that these newer, more potent compounds, in the concentrations tested, are no more likely to produce untoward symptoms than 2 per cent procaine. This is noteworthy as Epstein's[12] comparative study shows that teaching clinics will underrate the acceptability of a given solution rather than overestimate it, inasmuch as a considerably greater number of patients show no reactions to the anesthetic solutions in the private office than in the clinic. The patient in the private office is constantly reassured and protected in a more passive and favorable environment, whereas the clinical patient is exposed to apprehension and fear and is confronted with the intense activity and distracting surroundings of the clinic.

SUMMARY

Seven commonly used local anesthetic solutions which previously have not been compared with one another were evaluated clinically for potency, induction time, duration, the occurrence of untoward symptoms, and the effect of varying concentrations of vasoconstrictor. Induction times were within satisfactory practical limits for all solutions tested. The following observations were made:

1. The newer, more potent compounds produced a noticeable increase in depth of anesthesia. Of these, lidocaine 2 per cent with epinephrine 1:50,000 was su-

12. Epstein, S.; Throndson, A., and Schmitz, J. Comparative study of local anesthetic solutions in clinic and private practice. J.A.D.A. 42:414 April 1951.

perior for both conductive and infiltrative anesthesia.

2. Maxillary duration, except for 2 per cent procaine with epinephrine 1:60,000, did not vary greatly between solutions. Mandibular duration had considerable range among the various solutions.

3. The occurrence of untoward symptoms was very low and indicated that these more potent compounds were no more likely to produce untoward symptoms than procaine 2 per cent in clinical use.

4. The influence of vasoconstrictor concentration is not as precisely predictable as has been thought. Each concentration must be evaluated on the basis of its clinical performance.

Correction of occlusal disharmonies in presence of removable partial dentures

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When a dentist contemplates restoring the occlusion of a mouth and knows that a partial denture is to be used, he must assume that the mouth is a mutilated mechanism and give it the consideration necessary to further its usefulness. The partial restoration is also a transitional appliance between the complete dentition and the complete denture. The importance of this fact in relation to the problem of occlusion is that the general occlusal pattern of the substitute should correspond to the physiological form of the remaining natural teeth. If the remaining natural teeth are steep-cusped, then the substitutes should be likewise. If heavy attrition is shown, then the form of the substitutes should correspond. All other degrees between these occlusal patterns automatically will be developed if the partial restoration is made using a fully adaptable articulator, and any premature contacts in the natural teeth are corrected. Occlusal correction, therefore, must begin when the diagnosis is being made and a partial denture or dentures are anticipated.

If this is done properly, many teeth that might be extracted can be utilized. This procedure is of paramount importance to those teeth to be used as abutments, as they are going to be asked to carry their own load as well as that of the substitutes.

Most authoritative thinking has established the importance of occlusal harmony during the period of diagnosis.

Osborne and Lammie[1] said:

> It is universally accepted that a condition of balanced articulation is desirable in all natural dentitions as well as in full dentures. This state of affairs is equally desirable with partial dentures, but whereas with full dentures it can be achieved entirely in the dentures themselves, in partial dentures it must be the result of a combination of balance between the natural and artificial dentitions. This is impossible to achieve however if prior

1. Osborne, John, and Lammie, G. A. Partial dentures. Oxford, England, Blackwell Scientific Publications, 1954, p. 56.

to fitting the dentures balance does not exist in the remaining natural dentitions.

Krogh-Poulsen[2] stated that:

> Partial denture design is only one part of the treatment-planning for partially edentulous individuals, and is not always the most important. The treatment prior to insertion of partial dentures, which may include elimination of dental foci, treatment of the mucosa and the periodontal tissues, treatment of caries and its sequelae and occlusal equilibration is most essential.

When a partial denture is chosen as a result of diligent diagnosis and observation, the dentist not only calls upon all the experience mustered from his observation and practice, but also the knowledge he has acquired from his studies of all branches of restorative dentistry. The correction of the occlusion must be started before the partial restoration can be designed. In attempting to restore a partially crippled dentition with a substitute for missing parts, it is known that the occlusal pattern must be correlated with the temporomandibular movements. The dentist cannot depend on approximating two casts to each other by the facets of wear, as each tooth has some movement and so many mouths are not in centric relation.

The partial denture actually becomes a splint and supports some weak abutment teeth. Its purpose also is to absorb some of the load of the partially destroyed dentition. Occlusal correction begins before the partial restoration is undertaken. If teeth that will be called on to be abutments are in supraclusion, instability or failure can be expected.

The dentist should consider the ability of individual teeth to withstand various directional stresses, and permit each tooth to carry its share of the load. He should clasp them to the partial denture with "bonds of steel," so to speak, protect them with properly made restorations, support them through proper designing of the partial denture framework, and build the occlusal pattern of the substitute to harmonize with them.

THE PARTIAL DENTURE

Many methods have been used to achieve these maxillomandibular relations and to apply them properly to the articulator. Many operators, adept at full mouth reconstruction, accomplish this through the use of individually cast "clutches," using the remaining teeth as stabilizers and making good use of intraoral and extraoral tracing devices to detail the stylus tracing to transfer to the articulator the mandibular movement—the starting point from which occlusal rehabilitation can be accomplished.

Beckett[3] classifies partial denture types as tooth-borne or tissue-borne. The method of arriving at the maxillomandibular relations differs for each type. This is of great importance because in past methods of arriving at these relations no consideration was taken of soft tissue displacement, individual tooth movement and various degrees of supraclusion. This now can be accomplished by using self-curing resins to construct accurately fitting splints to hold intraoral or extraoral tracing devices in tooth-borne partial dentures. These splints also serve to stabilize the remaining teeth.

When these tracings are made, the metal partial denture framework may be used to hold the tracing devices. This serves other purposes than arriving at the maxillomandibular relation. It also stabilizes the abutment teeth, permitting occlusal eccentricities to be corrected.

It has been my experience that in tissue-borne partial dentures, this method is most satisfactory in arriving at correct maxillomandibular relation, because fully adapted bases of the soft tissue area will give firm foundations with which accurate tracings can be made. This method is far superior to the methods used in the past.

2. Krogh-Poulsen, W. Partial denture design in relation to occlusal trauma and periodontal breakdown. Acad. Rev. 3:18 July 1954.

3. Beckett, L. S. Accurate occlusal relations in partial denture construction. J. Pros. Den. 4:487 July 1954.

All this has been for the purpose of eliminating premature contacts and of arriving at proper centric and lateral relation, the two things that spell success or failure so often in partial denture construction.

These are the first steps of paramount consideration in the correction of occlusal disharmonies. Dentures never could be harmoniously constructed if these afore-mentioned disharmonies existed.

The occlusal pattern of the denture teeth now will match closely the occlusal pattern of the remaining natural teeth. If the cusps are steep, the denture teeth will have steep cusps. If the cusps are flat, it is obvious that the flatness is due to the demands of the temporomandibular movements correlated with the remaining teeth as the result of wear.

I must of necessity speak in generalities, as there are so many variations of the partial restoration. Too often the prime consideration has been the restoration of the lost parts in centric relation alone. The occlusal pattern, however, must conform to the existing occlusal pattern of the remaining teeth in regard to the steepness of the cusps to restore the function in the lateral and protrusive movements in order to accomplish a truly functioning unit.

Swenson and Terkla[4] have said: "The choice of teeth for the posterior region will vary according to the needs of each case."

Applegate and Perry[5] have classified the selection of teeth for the partial restoration in the following manner:

1. Differing hues and shapes of remaining teeth.
2. Abnormal sizes and spaces to be filled.
3. Shape and size of occluding teeth.
4. Lack of interarch space.

The selection of occlusal forms demands infinite patience.

After processing, the split-cast method may be used to correct any error which may have occurred up to this point of construction, and in spite of all precautions, occlusal disharmonies may have to be corrected somewhat in the mouth.

SUMMARY

1. Existing occlusal disharmonies must be corrected at the time of treatment planning.

2. Tracings must be made in both tissue and tooth-borne partial dentures.

3. Tracings may be made using the partial denture framework as the stabilizer, at which time premature contacts may be corrected.

4. Occlusal patterns not only must conform to the occlusal pattern of the opposing teeth but also should match the form of the remaining teeth.

5. The split-cast method must be used to correct any error that may exist prior to the actual finishing process.

6. Occlusal disharmonies may have to be corrected after the denture is inserted in the mouth.

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4. Swenson, M. G., and Terkla, L. G. Partial dentures. St. Louis, C. V. Mosby Co., 1955, p. 174.

5. Applegate, S. G., and Perry, Chester. Outline for removable partial denture service, ed. 2. Detroit, University of Detroit School of Dentistry, 1947, p. 71.

Physical properties of plastic teeth

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Plastic teeth have been used by the dental profession for approximately 15 years. During this period, considerable clinical evaluation has been made. Although dentists are not in total agreement as to the relative value of plastic as compared to porcelain teeth, the continued widespread sale of plastic teeth indicates that the dental profession has found them useful in restorative dentistry.

A survey of prosthodontists indicated that over 90 per cent of them had used or were using plastic teeth. One tenth used plastic teeth exclusively whereas others used them in varying degrees. The majority of the dentists answering this questionnaire were users of plastic teeth in particular situations where very short teeth were required.

The replies of this group indicated that plastic teeth are deficient in some physical properties and that other physical properties are satisfactory and desirable for dental use. It is also evident that different commercial brands of plastic teeth vary widely in some properties. Since differences have been noted, it is necessary to establish laboratory tests and data for the evaluation of plastic teeth. This report includes data obtained on several brands of plastic teeth.

PROPERTIES OF DENTAL SIGNIFICANCE

Plastics have many properties that make them attractive materials for production of teeth. The resins that have been most used are polymethyl methacrylate and copolymers in which methyl methacrylate is a major constituent. The chemical properties are very satisfactory. Methyl methacrylate polymers are nonpoisonous, are insoluble in the fluids found in the oral cavity, and the monomer is sufficiently chemically reactive to other methacrylates under heat and pressure to form a chemical bond. When mixtures of methacrylate polymer and monomer are subjected to heat and pressure in processing dentures, a chemical union results. Thus, the reaction of the monomer in the uncured denture base with the plastic teeth also forms a chemical bond between the denture base and the tooth. However, polymethyl methacrylate is soluble to some extent in most organic solvents such as ketones, aromatic hydrocarbons, and so forth, and it is important, therefore, that the denture not be cleansed in an organic solvent.

In general, mechanical properties of these resins are low in comparison with those of other dental restorative materials such as amalgam, gold alloy and so forth. The low mechanical properties such as strength, abrasion resistance, modulus of elasticity and hardness, however, have some advantages. The lower modulus of elasticity contributes to the

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elimination of a "clicking" sound such as is produced when porcelain teeth come in contact with each other. The low hardness and abrasion resistance facilitate the adjustment of the occlusion. Also plastic teeth have a high degree of toughness; therefore, less shattering or breaking occurs. Plastic teeth have a desirable esthetic appearance. Their optical properties make it possible to match shades and colors with those of natural teeth.

A serious drawback of some of the early brands of plastic teeth was crazing in service. The mechanism of crazing is not completely understood but is generally thought to be caused by the relieving of localized strain.[1] Crazing was commonly noticed after repair or rebasing of a denture. Formulations of the currently manufactured teeth are such that crazing is rarely observed. The use of cross-linked polymers is the main cause for this improvement.

TEETH INVESTIGATED

The teeth included in this investigation were procured and tested from 1950 to 1952. They were obtained from the following sources:

Trade Name	*Manufacturer*
Micromold	Austenal Laboratories, Inc.
Vitalon	Austenal Laboratories, Inc.
Trubyte Acrylic	The Dentists' Supply Co. of New York
Trubyte Dentron	The Dentists' Supply Co. of New York
Denta Pearl	H. D. Justi & Son, Inc.
S-R	H. D. Justi & Son, Inc.
Luxene	Luxene, Inc.
Dura-Blend	Myerson Tooth Corporation
Plastic Five-Phase	Universal Dental Co.
Verident	Universal Dental Co.
Biocryl	Biodent Mfg. Co. Heidelberg, Germany

EXPERIMENTAL PROCEDURE AND RESULTS

Crazing • Craze tests were made on plastic teeth in three conditions: (1) as received from the manufacturer, (2) after a curing cycle such as dentures normally receive in dental laboratories and (3) after a curing cycle in which special precautions were taken to prevent water from coming into contact with the tooth.

It was found that it was unnecessary to process the teeth in denture base material for the curing cycle. The technic used was as follows:

1. The teeth were invested in gypsum in a dental flask.
2. The invested teeth were heated in a temperature-controlled water bath.
3. The flask was bench-cooled to room temperature.
4. The teeth were deflasked and were allowed to dry to room temperature for several hours or longer.

The craze test consisted of immersing the teeth in a solvent (methyl methacrylate monomer or ethyl alcohol) for three periods of five seconds each, with an interval of one minute between each immersion. At first several solvents were used. Methyl methacrylate monomer and alcohol were finally chosen for test solvents as they would more likely be encountered in practical use: the monomer, when a denture is repaired or rebased, and the alcohol when beverages are taken orally.

The crazing was observed by visual inspection and also by the use of a binocular microscope. The specimens were given a second treatment after a day of storage if they did not show crazing immediately.

Table 1 shows that five brands did not craze, one brand exhibited crazing on some specimens and no crazing on other

1. Sweeney, W. T.; Brauer, G. M., and Schoonover, I. C. Crazing of acrylic resins. J. D. Res. 34:306 June 1955.

specimens, and five brands gave very definite crazing by the solvent test. Crazing was observed to be approximately the same for alcohol or methyl methacrylate monomer. In some instances the monomer caused slightly more crazing.

The types of crazing observed were quite varied as shown by examples in Figure 1. It was not possible to judge accurately the degree of crazing because some specimens contained many fine cracks whereas others contained fewer but larger cracks.

Examination of sections of crazed teeth, under a microscope, indicated that the depths of the cracks were rather varied, ranging from 0.2 to 1 mm. Teeth heated to 212° F. in water after investing showed more crazing than those heated to 160° F. in water.

Experiments were conducted to determine whether teeth susceptible to crazing would craze when heated under conditions such that no water came in contact with them during heating. Several procedures were used for this, such as (1) drying out free water from the gypsum by heating or reduced pressure, (2) surrounding the teeth with tin foil and (3) coating the teeth with a thick layer of wax before investing.

In all instances in which water in both liquid and vapor phase was prevented from coming in contact with the teeth, no crazing was produced by the solvent tests. This leads to the conclusion that water plays an important role in the crazing phenomenon.

Dentures worn by patients exhibit this same crazing but usually to a much less degree. Figure 2 shows a practical immediate denture which was rebased after eight months. The crazing appeared in the plastic teeth after rebasing; all six of the anterior teeth showed severe crazing and had to be replaced.

Mechanical Properties • Data were obtained on hardness (Knoop), indentation resistance, strength, modulus of elasticity and elastic recovery of the plastic teeth investigated.

Table 1 • Physical properties of plastic teeth

Brand	Craze*	Knoop indentation hardness number (100 Gm. load)			Indentation resistance (½ inch ball)		Ratio of load to projected area of indentation	Compressive properties	
		No. of observations	Average	S.D.†	Depth (30 kg. load = 10 min.)	Recovery (3 kg. load = 10 min.)		Modulus of elasticity	Yield strength
			kg./mm.²		mm.	%	psi	10^5 psi	psi
1	Yes	7	19.9	0.3	0.099	87	9,800	3.9±0.2	8,600
2	No	40	19.8	1.2	0.090	88	10,800	3.8±0.3	8,100
3	No	20	19.1	0.6	0.098	89	9,900	3.4±0.3	6,700
4	No	14	19.7	2.9	0.090	91	10,800	3.8±0.1	8,600
5	No	15	18.7	0.9	0.103	88	9,400	4.2±0.4	8,400
6	Yes	9	18.2	0.4	0.106	82	9,200	3.6±0.1	7,100
7	Yes	30	19.4	0.7	0.098	88	9,900	3.1±0.3	8,100
8	Yes	6	18.5	0.6	0.104	87	9,300	3.6±0.2	7,600
9	‡	19	18.1	0.6	0.098	91	9,900	3.8±0.3	8,600
10	Yes	19	18.2	0.7	0.148	70	6,400	2.8±0.5	6,400
11	No	6	14.6	0.5	0.099	82	9,800	4.1±0.1	8,400

*Solvents used were methyl methacrylate monomer and ethyl alcohol, after normal curing cycle.

†Standard deviation $\sqrt{\frac{\sum_{i=1}^{n}(x_i-\bar{x})^2}{n-1}}$

‡Some specimens crazed, others did not.

Hardness • Hardness was determined with a Kentron tester with a Knoop indenter at a temperature of 70° ± 2° F., using a 100 Gm. load with a 10 second descent, and 20 second contact. The teeth were cut and polished to a smooth flat surface about 2 mm. from the tip of the cusps. The final polish was made with fine polishing paper (no. 000) followed by fine whiting. The teeth were measured in the "as received" condition, that is, not dried or stored in water before testing. The Knoop indentation numbers are given in Table 1.

Indentation Resistance and Recovery • Flat specimens 2 to 3 mm. thick were cut from plastic teeth. The surfaces were finished with no. 1 G sandpaper. The specimen was placed in a Rockwell superficial hardness tester and subjected to a 30 kg. major load with a ½ inch ball for ten minutes. At the end of this period the depth of indentation was observed, the major load was removed, and the minor load of 3 kg. was applied for ten additional minutes. At this time the depth of indentation was again observed. The recovery value is expressed in percentage of the depth of indentation. The results shown in Table 1 are averages of six specimens. The results are compared in Figure 3 with observations made on direct filling resins and dental amalgams.

Ratio of Load to Projected Area of Indentation • Since in the procedure described previously the indenter sphere continues to penetrate the resin until the area of contact is sufficient to resist the force exerted on the specimen, the ratio of the load to the projected area of the indentation gives a basis for comparing strength of similar materials. The projected area of the indentation can be calculated from the depth reading on the Rockwell superficial hardness tester with a correction for the slight indentation of the minor load.[2] The load divided by this area gives an indication of the strength in the same units as stress. The data obtained for this ratio for specimens cut from plastic teeth are shown in Table 1.

Stress-Strain Relationship • Cylindrical specimens 3 mm. in diameter by 6 mm. in length were machined from the

2. Sweeney, W. T.; Sheehan, W. D., and Yost, E. L. Mechanical properties of direct filling resins. J.A.D.A. 49:513 Nov. 1954.

Fig. 1 • Examples of crazing produced by immersion of plastic tooth in solvent

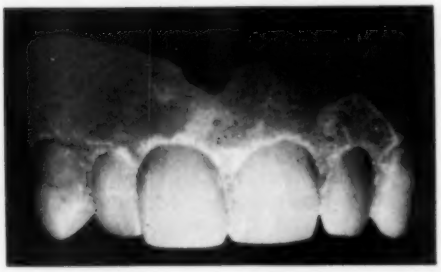

Fig. 2 • Crazing of teeth on immediate denture after rebasing

plastic teeth. The specimens were placed in a Tinius Olsen testing machine and loaded in compression at an average strain rate of approximately 0.003 inches per inch per minute. The specimens were mounted between two steel bearing blocks ½ inch in diameter. Two 1-inch Tuckerman strain gauges were mounted on the bearing blocks to measure the axial deformation of the specimen. The deformation of the portions of the bearing blocks within the gauge length was considered to be negligible. The strain was recorded at 2½ pound load increments.

The modulus of elasticity was calculated from the straight portion of the stress-strain curve below 7,000 psi (Fig. 4-6). The compressive "yield strength" for the purpose of this paper is defined as the stress (load per unit of cross-sectional area) at which the deformation produced by a stress increment equals or exceeds 1.25 times that observed in the first few increments of stress starting at approximately 1,000 psi.[3] The values for the modulus of elasticity and "yield strength" shown in Table 1 are averages of four to eight specimens.

Abrasion or Wear Resistance • The data obtained on abrasion of teeth are of a very preliminary nature and are reported at the present time for information on the ball mill type of test. The method used involves abrading the teeth in a ball mill and observing the loss of weight. The mill was a one quart Abbe porcelain jar mill rotating at 69 revolutions per minute. To compare the wear of different brands of teeth the mill was charged with the abrasive material and a total of 40 to 50 teeth of various brands, which had been saturated in water, and was run for periods of time ranging from two hours to several hundred hours.

The relative effects of several different abrasive materials and of different tooth shapes are shown in Tables 2 and 3, respectively. The relative wear of eight brands of teeth when placed in the mill with steel balls with and without additional abrasives is given in Table 4. Most consistent results were obtained when ¼ inch steel balls with no. 200 Aloxite powder in water was used as the abrasive material according to the following technic:

1. One thousand three hundred and fifty grams of ¼ inch carbon steel balls were washed with distilled water and allowed to drain.

3. Peffenbarger, G. C.; Sweeney, W. T., and Isaacs, A. Wrought gold wire alloys: physical properties and a specification. J.A.D.A. 19:2061 Dec. 1932.

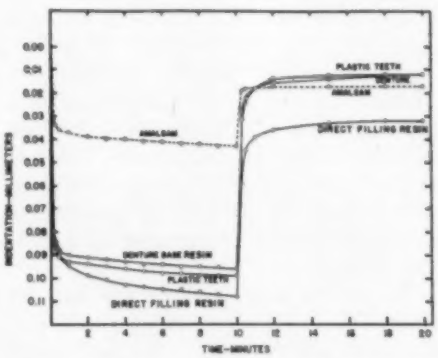

Fig. 3 • Indentation and recovery of plastic teeth (average of ten brands), denture base resin, direct filling resins and amalgam in Rockwell superficial hardness tester with ½ inch ball and ten minute load of 30 kg. and ten minute load of 3 kg.

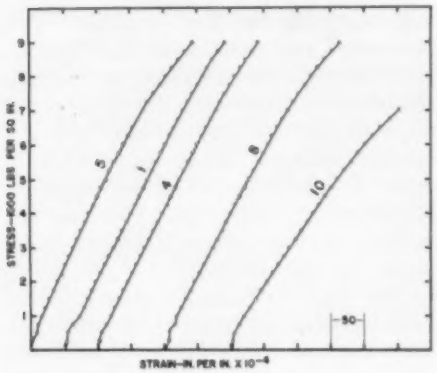

Fig. 4 • Stress-strain curves for five brands of plastic teeth

2. Teeth were selected, marked and individually weighed. The teeth used should be fairly large, from 0.3 to 0.5 Gm. except in teeth with mechanical retention holes; for the latter, teeth weighing 0.25 to 0.45 Gm. will be about the same size as the others. To mark the teeth for identification, shallow holes were bored in recessed parts of the teeth and these were filled with drawing inks of various colors.

3. The balls, 20 Gm. of no. 200 Aloxite powder and 100 Gm. of water were placed in the one quart jar, which was centered on the mill and run for two hours.

4. The used Aloxite powder was cleaned out, the jar and balls rinsed with distilled water and immediately 20 Gm. of fresh no. 200 Aloxite powder, 100 Gm. of distilled water and from 40 to 50 teeth were added. The test was run immediately after the cleaning charge and for a definite time.

5. At the conclusion of the test the teeth were removed from the mill and weighed individually. The percentage loss in weight was calculated.

For comparison of brands the average loss for a given brand was divided by the loss for one brand selected as a standard. This gives a number that seems to be relatively constant for any run made with the same abrasive and conditions.

Although the data obtained from the ball mill tests show differences between the various brands of teeth, no data have yet been obtained indicating whether or not the test results correlate with the wear that occurs in service. Much more research will be needed before any statement can be made on the relative clinical wear resistance of various brands of teeth.

DISCUSSION OF RESULTS

The craze resistance seems to be a function of the processing conditions. During curing of the denture, the water absorbed by the plastic teeth that are susceptible to crazing evidently plays an important role, since it was shown that when water was prevented from contacting a tooth the tooth so treated was craze resistant. Also, teeth invested in dental stone and heated in boiling water exhibited more crazing by the solvent test than did those heated to 160° F. in water. This may have been caused by the greater mutual solubility of resin and water at the higher temperature.

Although the mechanism of crazing is not established, the theory has been proposed that the relative solubility of water

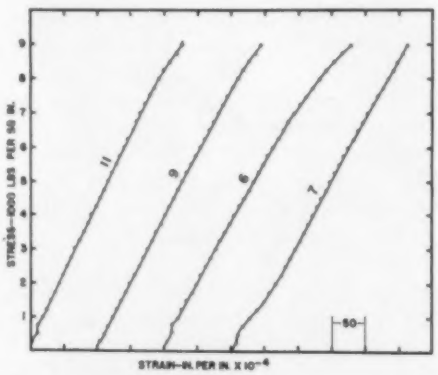

Fig. 5 • Stress-strain curves for four brands of plastic teeth

and resin changes with temperature and that the dimensional change caused by absorption of water during curing and separation during cooling is the basic cause of the residual strain in the resin.[1]

So far as the present experimental data are concerned, the facts correlate satisfactorily, but more observations of a precise nature are necessary to prove the validity of this theory. No correlation between complete craze resistance and the amount of water sorption was found in this investigation.

Unfortunately there is no practical method for fabricating dentures under water-free conditions, as an excess of free water is present in the set dental stone or plaster used to invest dentures for processing. It is considered best, therefore, to use teeth that do not exhibit crazing if this difficulty is to be overcome.

The indentation hardness values determined by the Knoop method show that the range in hardness is small. This is to be expected because the teeth are essentially methyl methacrylate polymers with the exception of one brand that contains considerable vinyl chloride-acetate and has a lower Knoop indentation number.

The ability of the tooth to resist deformation from pressure applied to a local area such as biting on a hard particle of food, bone and so forth is important. To evaluate this property the rate of indentation by a sphere under constant load was used. The rate of indentation is dependent on the mechanical properties of the sample. The rate of penetration of the ball into the specimen is fast for the first few seconds and then gradually decreases until the ball comes to rest. For practical procedures a 10 minute load application was found to approach very closely a static condition. This provided a simple method for observing the flow properties and resistance to indentation. The probable error of the depth of indentation under the best condition is of the order of 2 per cent.

The depth of indentation for 10 of the 11 brands of teeth studied varied from 0.090 mm. to 0.106 mm. The other brand (no. 10) had an extremely high value, 0.148 mm., and is not included in the average because of the excessive amount of porosity observed. The average indentation of 0.098 mm. for the ten brands is between those for denture base resin (0.096 mm.) and the direct filling resins (0.108 mm.), and is much greater than that obtained for dental amalgam (0.043 mm.) under the same test conditions. The

Table 2 • Effect of various abrasives on weight loss of teeth in ball mill test*

Abrasive	Weight loss per hour, %	
	Dry	Wet
Oxford crystal feldspar	0.002	—
No. 18 glass beads	0.002	—
Flint pebbles	0.01	0.04
Steel balls ¼ inch	—	0.02
Steel balls ½ inch	—	0.1
Flint pebbles roughened with carborundum	—	0.2
No. 200 Aloxite, ¼ inch steel balls	0.2	0.7
Fine carborundum, ¼ inch steel balls	0.3	—

*Time of test varied from a few hours for the more abrasive to several days for the less abrasive charges.

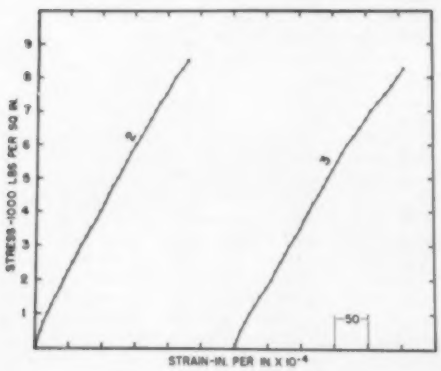

Fig. 6 • Stress-strain curves for two brands of plastic teeth

Table 3 • Effect of tooth shape on weight loss of teeth in ball mill test

Brand	Cuspid			Lateral incisor			Central incisor		
	Weight Gm.	Weight loss		Weight Gm.	Weight loss		Weight Gm.	Weight loss	
		Gm.	%		Gm.	%		Gm.	%
Abrasive: Wet ½" balls Time: 25 hours									
8	0.3549	0.0083	2.34	0.2277	0.0082	3.60	0.3734	0.0088	2.36
11	0.3936	0.0065	1.65	0.2794	0.0064	2.29	0.4254	0.0071	1.67
1	0.3296	0.0074	2.24	0.2131	0.0058	2.72	0.3296	0.0084	2.55
Abrasive: Wet ¼" balls Time: 20 hours									
8	0.3764	0.0014	0.37	0.2791	0.0014	0.50	0.2697	0.0013	0.48
11	0.4033	0.0003	0.07	———	———	———	0.4755	0.0009	0.19
1	0.3509	0.0013	0.37	0.2268	0.0017	0.75	0.3670	0.0016	0.44

average results for the three types of materials are shown in Figure 3.

One of the fundamental properties of resins is the property of absorbing energy by deformation and returning closely to the original form. This is a factor in denture prosthesis, as the energy absorbed by oral structures probably plays an important role in resorption of tissue. The recovery of the plastic teeth as measured by the decrease in depth of the indentation of a spherical ball when the load on the ball was reduced from 30 to 3 kg. ranged from 82 to 91 per cent for ten of the brands tested. The eleventh brand, which also had a high indentation value, recovered only 70 per cent.

The modulus of elasticity in compression computed over stress ranges of 1,000 to 7,000 psi varied from 280,000 to 420,000 psi for the different brands. This property is significant as it indicates the stiffness of these materials. The yield stress of plastic teeth is low. The "yield strengths" as calculated from the stress-strain curves ranged from 6,400 to 8,600

Table 4 • Relative wear of various brands of teeth in ball mill test

Brand	Wet Aloxite powder and ¼" steel balls*			Dry Aloxite ¼" steel balls	Dry fine carborundum ¼" steel balls	Wet ½" steel balls	Wet ¼" steel balls
	8 hr.	4 hr.	8 hr.	4 hr.	4 hr.	25 hr.	2 hr.
4	1.92	1.69	1.74	1.95	1.93	—	1.17
2	—	1.21	1.17	1.28	1.17	—	.85
6	1.05	1.12	1.04	1.49	1.08	—	.96
5	1.07	1.06	1.14	1.28	1.13	—	.83
8	1.02	1.04	1.04	1.15	1.04	1.10	.85
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	.88	.92	.96	1.16	.99	—	.83
11	.53	.46	.54	.36	.53	.75	.51
10	—	—	—	—	—	.88	

*Values for three runs are given to show precision of results. Brand 1 is used as reference value.

psi. These values are considerably lower than the masticating stress of 17,000 psi on cuspids as calculated by Skinner.[4] The fact that plastic teeth used in clinical dentures do not exhibit much deformation is explained partially by the high recovery value (Fig. 3).

Abrasion or wear resistance of plastic teeth is one of their weakest properties. At present the work on abrasion measurement is only in the development stage. It is considered essential that new and more practical test methods be developed to evaluate this factor.

SUMMARY

The mechanical properties of eleven brands of plastic teeth were investigated and the following observations were made:

1. The mechanical properties were low in comparison with those of other materials used for restorative purposes in the oral cavity.
2. Some brands of teeth were found to be susceptible to crazing after a processing cycle similar to the curing of a denture. Five brands crazed consistently, five brands did not craze and one brand crazed in some instances.
3. Crazing was not observed on any teeth if water was prevented from contacting them during heating.
4. The resistance to crazing was found to be the most outstanding difference between the commercial brands studied.
5. No definite correlation was found between the physical properties studied and crazing.

4. Skinner, E. W. Science of dental materials, ed. 3. Philadelphia, W. B. Saunders Co., 1946, p. 17.

Preventive Health Service • The emphasis in preventive health service has shifted from the lowering of hazard to the raising of immunity; and in doing so it has shifted from things which can be done for people to things which people must do for themselves. This change is significant; it reversed a long accepted trend. In equating himself with his environment, it has been the pride of progressive man to make his environment fit him. To accept the environment and learn to be equal to it is by no means orthodox but it is refreshingly sane. But there still lies far in the background the concept of health as a dynamic condition, of which immunity to disease is only one reflection. Our knowledge of constitutional types is still slight, still slighter is our knowledge of what determines the strange variations in apparent vitality between man and man or how far this elusive quality can be developed. Occasional innovations in teaching and training assert and demonstrate that we might make more of ourselves than in fact we do; but, by and large, only the mountaineer and the athlete try to get fit, rather than merely to keep well. People seem to think that the role of science is to remove hazards, rather than to fit us to face them. This is a dangerous fallacy. Neither physical science nor medicine or dentistry can obtain that—except at a price which mankind will be unwilling to pay. *Geoffrey Vickers.*

Occlusal factors in mandibular displacement

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The establishment or maintenance of a well-balanced, harmonious relationship of the stomatognathic system is the goal of dentists in treating their patients. The methods of treatment that lead to this goal, however, are many and varied. In some instances, these various forms of treatment result in inharmonious relations of the component parts which compose the stomatognathic system because of the hypotheses on which these methods are based. The concept of an ideal occlusion of the teeth is very well established even though this type of occlusion is rarely seen in the natural dentition.

The periodontist, in equilibrating the natural dentition, is concerned not only with the physical contact of the teeth and the resultant effect on the periodontium but also with the effect that the results of equilibration may have on the physiology of the neuromuscular system and the functioning of the temporomandibular joints. Many patients with temporomandibular joint disturbances have been treated successfully by means of occlusal equilibration. Since the temporomandibular articulation is a freely movable joint, it must be borne in mind that the intercuspation of the teeth will influence the movements of the condyle.

CONDYLE AND GLENOID FOSSA

There exists a difference of opinion concerning the position of the condyle in the glenoid fossa. There are several schools of thought as to the relation which the condyle bears to the glenoid fossa. Riesner[1] stated:

> The articular relationship with the teeth occluded is between the upper part of the anterior surface of the condyle and the posterior surface of the articular eminence.

Another investigator in this field, Goodfriend,[2] concluded:

> With the teeth occluded, the condyle is not in articulation with the mandibular fossa. The articulation is between the anterior portion of the superior surface of the condyle and the inferior portion of the posterior surface of the articulating eminence.

The preceding statements are applicable not when the musculature is in a state of physiologic rest but when it is in a state of contraction.

B. B. McCollum[3] and his followers are of the opinion that "both condyles are in their most retruded positions in the fossae." If this were true, then the clin-

The opinions and assertions contained herein are the private ones of the writer and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

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1. Riesner, S. E. Temporomandibular articulation: Its consideration in orthodontic diagnosis. Internat. J. Orthod. & Oral Surg. 22:1 Jan. 1936.

2. Goodfriend, D. J. Symptomatology and treatment of abnormalities of the mandibular articulation. D. Cosmos 75:844 Sept. 1933.

3. McCollum, B. B., and Stuart, C. E. A research report; basic text for the postgraduate course in gnathology, School of Dentistry, University of Southern California. South Pasadena, Calif., Scientific Press, 1955.

ical entity of posterior displacement of the condyle could not exist, because by definition the condyles are already in their most retruded position.

According to Sicher:[4]

> Most individuals are able to pull the mandible slightly backward from its rest position, but this movement is possible only under considerable muscular force and against resistance exerted by tension of the capsule in front of the joint and compression of the soft tissues (parotid gland) behind the condyle. This movement does not play any role in the physiology of the human mandibular joint but has some significance in that it demonstrates the rather labile position of the mandibular head.

Studies by Thompson[5] have shown that the normal movement of the mandible, as it moves from physiologic rest position to occlusal vertical dimension, is upward and forward when observed at the chin point or gnathion.

If the movement of the mandible is altered from the normal pattern, as dictated by the musculature, temporomandibular joint disturbances may develop. The presence of malposed teeth or the absence of teeth, the placement of individual restorations or the addition of prosthetic appliances, fixed or removable, or some other such influence may be the initiating factor in producing abnormal closure of the mandible as it moves from rest position through a normal freeway space to full contact of the teeth.

DIAGNOSIS AND TREATMENT OF TEMPOROMANDIBULAR JOINT DISTURBANCES

A displacement of the mandible in a posterior, anterior, superior or right or left lateral direction can be diagnosed by observing the functional movement of the mandible from physiologic rest position to full occlusion while the patient's head is in an upright position. If this functional movement of the mandible is not observed or is possibly interfered with, as when the operator tries to assist the patient by grasping the chin with his thumb and forefinger and "jiggling" the mandible into position or when the patient's head is not in an upright position, a false diagnosis may be obtained. The patient must have free movement of the mandible, as determined by the musculature, without the use of any appliances or outside aids as mentioned.

The question of what is the normal position of the condyle in the glenoid fossa and how can it be determined can now be considered. Of the various methods of study, the best approach to recording the normal position of the condyle for

4. Sicher, Harry. Oral anatomy. St. Louis, C. V. Mosby Co., 1949, p. 171.

5. Thompson, J. R. Rest position of the mandible and its significance to dental science. J.A.D.A. 33:151 Feb. 1946.

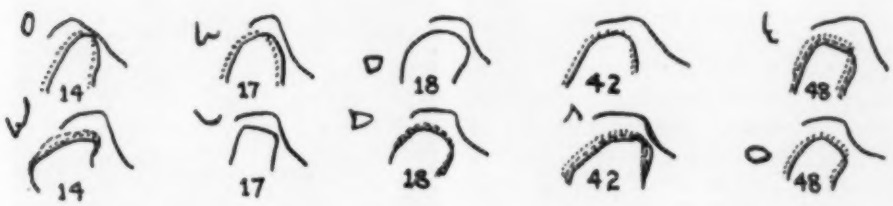

Fig. 1 • Superimposed tracings from roentgenograms, showing relation of condyles and fossae when mandible is in physiologic rest position (solid line), when there is initial contact (broken line) and when teeth are in full occlusion (dotted line). In all instances, there was displacement, as evidenced by dissimilar movements of left condyle (row above) and right condyle (row below) in same patient. In these instances, lateral displacement of mandible was seen clinically as mandible moved from initial contact to full occlusion

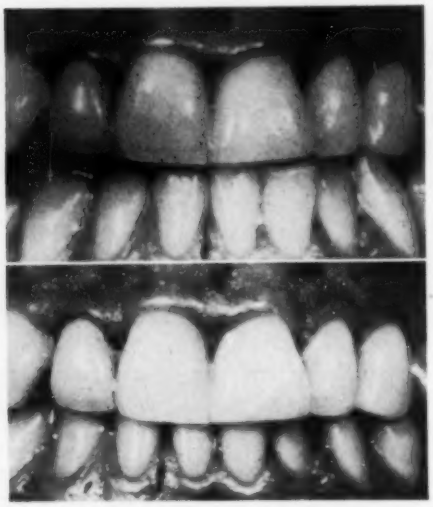

Fig. 2 • Above: Initial (premature) contact of teeth before treatment. Below: Teeth in full occlusion before treatment. Mandible moved from physiologic rest position to initial contact through acceptable freeway space and in upward and forward direction. Note lateral shift of mandible. Vertical mark on gingival tissues between mandibular lateral and central incisors was used as a reference point in relation to maxillary incisors

each patient is by roentgenographic examination. If determination of the position of the condyle is attempted by means of the skeleton, the soft tissues, including the disk, are not considered in the study; if the attempt is made by a "wet" dissection the action of the associated musculature cannot be considered. If determination of this position is attempted with the aid of study models, only a single fixed position can be recorded. This last procedure ignores the functional movements of the mandible from rest position to full occlusion. Therefore, the use of the x-ray machine, with several exposures being taken at one sitting and the superimposing of them to obtain tracings, if necessary, has been the most successful procedure to date. The patient's head must be in an upright position during the exposure of the film by the x-ray machine and the mandible must be at physiologic rest position. When the head is in any other position, gravity will alter the position of the mandible so that it will not be in the physiologic rest position, and the condyles also will not have their normal relations to the glenoid fossae. The importance of establishing the normal path of closure of the mandible from physiologic rest position to full occlusion (teeth in maximum contact) is evident when determination of the displacement of the condyle is attempted. In a previous study it was determined that the movement of the condyle may be rotatory or translatory as the mandible moves from rest position to full occlusion of the teeth.[6] In a normal dentition, there is no change in the condylar region clinically or roentgenographically when teeth are at the point of initial contact and in full occlusion, but, in instances of displacement of the mandible, there is a corresponding displacement of the condyle (Fig. 1). In these instances, there

6. Alexander, P. C. Movements of the condyle from rest position to initial contact and full occlusion. J.A.D.A. 45:284 Sept. 1952.

Fig. 3 • Dentition of same patient as in Figure 2 after treatment. Initial contact (above) and full occlusion (below) are now identical

Fig. 4 • Dentition of another patient showing excessive wear of labial surfaces of mandibular anterior teeth, which was area of initial contact, which caused posterior displacement of the mandible. Note markings from articulating paper on lower teeth

is a distinct movement of the mandible from the point at which there is initial contact to full occlusion. This movement, which is interpreted as a displacement, is due to the guiding influences of the teeth as the mandible moves from the position of initial contact to that of full occlusion.

REPORT OF CASES

Figure 2 shows the dentition of a patient whose jaws before treatment closed through an acceptable freeway space, with the chin point moving upward and forward to the point of initial contact. When the jaws closed from initial contact to full occlusion, there was a pronounced lateral shift of the mandible. The lateral shift, caused by further contraction of the muscles of mastication and influenced by the inclined surfaces of the teeth, resulted in an eccentric position of the mandible. This cannot be termed centric occlusion, even though the teeth are shown in maximum contact, because the muscles and ligaments involved were under a strain and the patient had a typical syndrome of temporomandibular joint pain. Figure 3 shows the dentition of the patient after treatment. The premature contacts have been eliminated, and equilibration of the occlusion has been obtained. The points of initial contact and full occlusion are identical; this now may be called centric occlusion, as the stomatognathic system is now in balance and the symptoms of pain have been eliminated.

In Figure 4 an instance is shown of a posterosuperior displacement of the mandible with premature or initial contact of the labial surfaces of the mandibular anterior teeth with the lingual surfaces of the maxillary teeth, which was shown by the pronounced abrasion on the mandibular anterior teeth.

Functional analysis of this patient's stomatognathic system revealed a normal path of closure of the mandible as it moved through an acceptable freeway space to the point of initial contact of the teeth (Fig. 5, above). From the point of initial contact to full occlusion (Fig. 5, below), however, there was a decided posterosuperior displacement of the mandible and accompanying posterosuperior

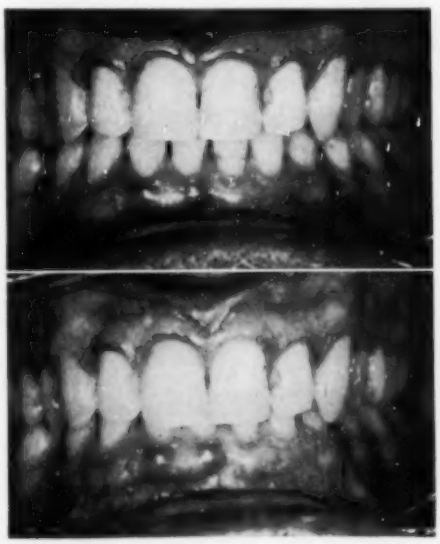

Fig. 5 • Initial contact (above) and full occlusion of teeth (below) before treatment. Same patient as in Figure 4. Mandible moved in posterosuperior direction from initial contact to full occlusion

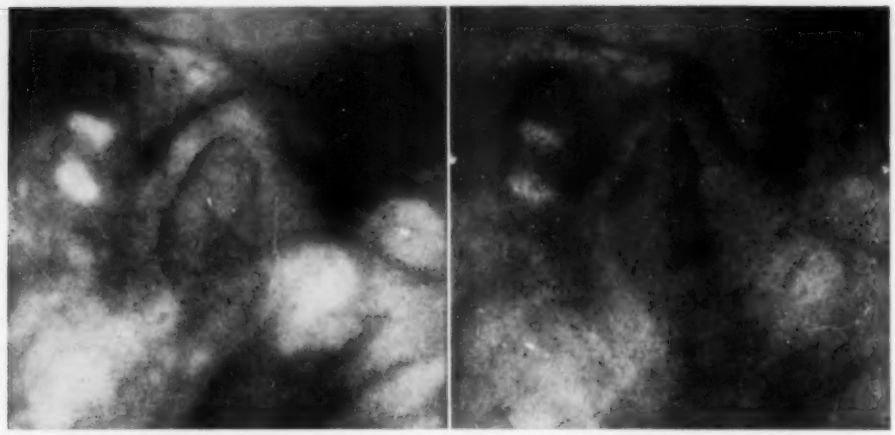

Fig. 6 • Roentgenograms of left temporomandibular joint before treatment. Same patient as in Figures 4 and 5. Left: Relation of condyle to glenoid fossa with initial or premature contact of teeth. Right: Position of condyle with teeth in full occlusion. Note posterosuperior displacement of condyle. Left and right condyles showed same movement

movement of the condyles in the glenoid fossae. Roentgenograms of the temporomandibular joints taken before treatment with the patient in a sitting position are shown in Figure 6. The patient complained of pain which became more pronounced during the mastication of food in the temporomandibular joint regions.

The patient was treated by equilibration of the occlusion, thus permitting the musculature and ligaments to act physiologically without being influenced by the position of the teeth.

Fig. 7 • Dentition after treatment. Same patient as in Figures 4, 5 and 6. The initial contact of the teeth and full occlusion are now identical. Mandible moves upward and forward, and posterior displacement has been eliminated by means of selective tooth grinding

Figure 7 shows the dentition of the patient after treatment. The mandible now moves upward and forward with no displacement from initial contact to full occlusion, these positions now being identical. This position can now be called centric occlusion because the chin point has moved upward and forward, the occlusal surfaces of the teeth are in maximum contact, and the mandible and the condyles are in a state of balance with the associated musculature and ligaments, and the mandible is in its correct relationship to the maxilla and the cranium. The elimination of the patient's symptoms and of the posterosuperior displacement of the condyles is further evidence that the stomatognathic system is in balance during function (Fig. 8).

When treating patients with temporomandibular joint disturbances by means of selective tooth grinding, it must be remembered that the physiologic rest position remains the same before and after treatment. Therefore, there is a common denominator from which a diagnosis can

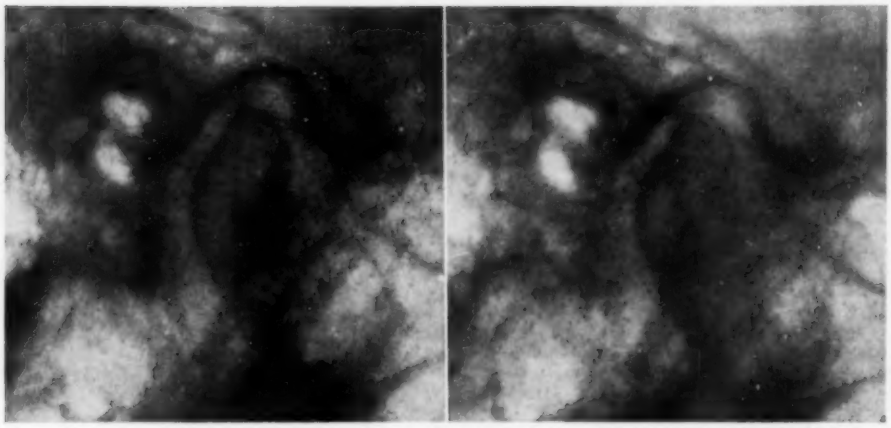

Fig. 8 • Roentgenograms of left temporomandibular joint of same patient as in Figures 4, 5, 6 and 7 after treatment. Positional relation of condyle to glenoid fossa is identical. Posterosuperior displacement of condyle has been eliminated. Compare with Figure 6. Left: Relation of condyle to glenoid fossa with initial or premature contact of teeth. Right: Position of condyle with teeth in full occlusion

be made, and rational therapy instead of empirical and palliative forms of treatment can be instituted.

SUMMARY

In the diagnosis and treatment of temporomandibular joint disturbances by means of selective grinding of the teeth, the balance of the stomatognathic system is of paramount importance. The functional movements of the mandible, as determined by the neuromuscular system, must be taken into consideration.

Acceptance of the premise that the condyle lies in the most retruded position in the glenoid fossa does not permit the correction of posterior displacements of the condyle because, by definition, the condyle is already as far back as it can go in the glenoid fossa. The failure to recognize a posterior or a posterosuperior displacement of the condyle limits the operator in the treatment of joint disturbances of his patients.

If the problems of occlusion and temporomandibular joint disturbances are to be understood fully and treated, the approach must be in accord with the basic principles of neuromuscular physiology and with the physiology of the temporomandibular joints.

The Best Teaching Method • The method of teaching which approaches most nearly to the method of investigation, is incomparably the best; not content with serving up a few barren and lifeless truths, it leads to the stock on which facts grew. *Kenneth Burke, The Curve of History, 1955.*

Silicate cements and direct filling resins: a comparative study

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Silicate cement has been in use as a restorative material for over 50 years. Although it has some qualities that are not desirable, it has constituted a worthy contribution to dental health service by prolonging the usefulness of countless teeth. Even so, silicate cement has been regarded by most dentists as a somewhat temporary material.

Therefore, great clinical interest in the direct filling resins followed their introduction to the profession in the United States in 1949[1] because of their lifelike appearance and low solubility. Unfortunately, in the beginning little was known about the physical properties of the direct filling resins or of their effect on the pulp. Because of this lack of knowledge, the early technics for handling the direct filling resins were faulty. In fact, the technics were patterned after those using silicate cement, which had physical and chemical characteristics much different from those of the resins.

The physical properties of both silicate cement and the direct filling resins are now well known, so it would seem logical to make a clinical comparison of these materials as a basis for some conclusion concerning their effectiveness as restorative materials. Consideration of the following properties may be useful in such a comparison:

1. Solubility.
2. Dimensional stability.
   a. Change on hardening.
   b. Change on water sorption.
   c. Change on drying.
   d. Thermal expansion.
   e. Marginal seal.
3. Color stability.
4. Compressive strength.
5. Anticariogenic action.
6. Effect on the pulp.

SOLUBILITY

Silicate Cement • The solubility of silicate cement is its greatest defect. In fact, the tendency of this material to dissolve and disintegrate in the mouth makes it a temporary filling material. It has been estimated by Paffenbarger[2] that the average life of a silicate cement restoration is four and a half years. The consequence of such a short life involves frequent replacement, usually with cavity enlargement. But far more important is the loss of tooth contour, since tooth form and contact are the most important attributes of any restoration. No mouth can remain healthy for long where tooth form has been disregarded. The contour of a tooth is such as to protect the soft tissues from trauma during mastication; so the solu-

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1. Coy, H. D. Direct resin fillings. J.A.D.A. 47:532 Nov. 1953.

2. Paffenbarger, G. C. Silicate cement: an investigation by a group of practicing dentists under the direction of the A.D.A. Research Fellowship at the National Bureau of Standards. J.A.D.A. 27:1611 Oct. 1940.

bility of silicate cement, which causes a restoration made with it to lose tooth form and contact, is its greatest weakness.

It has been pointed out by various authors that as middle age approaches, many more teeth are lost from periodontal disease than from caries; therefore, some thought should be given to this problem and the possible influence solubility and disintegration of restorative materials have on it.

Solubility in a silicate cement restoration can be minimized by a proper mixing technic. When a mix of silicate cement powder and liquid is completed and the material is set, it is essentially a gel-like substance in which small solid particles of the powder are held in suspension. The more powder particles and the less binder or gel there is in the set cement, the more strength and the less solubility the restoration will have. Therefore, mixing on a chilled slab or in a rubber[3] sack develops the optimum powder-liquid ratio and produces a restoration having the least solubility. If this is not done, the length of service of the resultant filling will be shortened considerably.

Fillings placed under the free margin of the gingiva become a source of irritation to the soft tissue for two reasons: (1) the material itself is an irritant to the soft tissues and (2) the filling dissolves away and exposes the sharp cavity margins causing subsequent pathologic disturbance of the soft tissue. It would seem, therefore, that silicate cement is contraindicated in all Class V cavities extending under the free margin of the gingiva.

Direct Filling Resins • The direct filling resins are practically insoluble. In this respect they are far superior to silicate cements.

DIMENSIONAL STABILITY

Change on Hardening • The silicate cements shrink approximately 2 per cent by volume on hardening. The direct filling resins shrink from three to four times this amount. Therefore, the direct filling resins are decidedly inferior to the silicate cements in regard to this factor. Much of the effect of the large shrinkage on hardening of the direct filling resins can be directed toward the open face of the restoration by the use of the brush-on technic.[4]

Change on Water Absorption • No evidence is available showing expansion on water sorption in a set silicate cement. If the cement is not fully set, there is a surface expansion on contact with water.[5] The direct filling resins swell from 1 to 1.5 per cent by volume on absorbing water and, therefore, are inferior to the silicate cements in this respect.[6]

Change on Drying • The silicate cements shrink to such a degree on drying out that they craze with subsequent discoloration. The original size of a restoration is not recovered on absorbing water or saliva.[5] The resins shrink on drying and recover completely on wetting. The resins are superior to silicate cement in this respect and, therefore, would be the choice between the two types of materials for mouth breathers.

THERMAL EXPANSION

The coefficient of thermal expansion of teeth, silicate cement and acrylic resin (in parts per million per degree Centigrade) is as follows: tooth structure, 10; silicate cement, 7, and acrylic resin, 80.

3. Grunewald, A. H., and others. Silicate cement: method of mixing in a closed container to prevent effects of exposure to atmosphere. J.A.D.A. 46:184 Feb. 1953.

4. Nealon, F. H. Acrylic restorations: operative non-pressure procedure. New York J. Den. 22:201 May 1952.

5. Souder, W., and Paffenbarger, G. C. Physical properties of dental materials. National Bureau of Standards Circular C433. Washington, D. C., Government Printing Office, 1942.

6. Smith, D. L., and Schoonover, I. C. Direct filling resins: dimensional changes resulting from polymerization shrinkage and water sorption. J.A.D.A. 46:540 May 1953.

Silicate Cements • The coefficient of thermal expansion of silicate cement is the nearest that of tooth structure of any of the filling materials. In this quality it is superior to any other filling material.

Direct Filling Resin • The coefficient of thermal expansion of the direct filling resins is about eight times that of tooth structure. This is its weakest point, and many investigators believe if this deficiency could be overcome, it would eliminate much of the controversy which now envelops the resins. Many attempts have been made to reduce the thermal expansion, but none so far has been successful. Included in the attempts to control this wide thermal change have been the efforts to make the material adhesive, but no studies have yet been reported in which the material remained adhesive to hard tooth tissues under oral conditions.

MARGINAL SEAL

Silicate Cements • Nelsen, Wolcott and Paffenbarger[7] demonstrated that the marginal seal of filling materials has some relation to the difference between the thermal expansion of the teeth and the filling materials. Silicate cement, therefore, produces a better marginal seal than the direct filling resins.

At the Medical College of Virginia School of Dentistry, a permanent chart record is kept of each patient. A study was made of service given by silicate cement and direct resin fillings.

It was possible to recall 40 patients in whose mouths were placed 123 silicate cement fillings of approximately the same age as the direct filling resin fillings. Of these 123 fillings, 52 had been already replaced. Seventy-one were still available for observation; 22 of the 71 were in poor marginal condition and badly dissolved out of the cavity, needing replacement. Only 49 of the 123 silicate cement fillings survived five years of service (Table 1).

Direct Filling Resins • Concerning the direct resin fillings in the study, report was possible on only 22 patients of the 49 contacted in 1953.[8] Thirty-three direct resin fillings had been placed in these 22 patients in 1949 and 1950, and 10 of these restorations were still giving acceptable service (Table 1). Twelve direct resin fillings had been replaced (4 with inlays, 2 with amalgam and 6 with silicate cement) and with the remaining 11, caries was present under or around the margins, and the fillings needed replacement.

COLOR STABILITY

Silicate Cement • If any mouth condition arises to cause dehydration of a sili-

7. Nelsen, R. J.; Wolcott, R. B., and Paffenbarger, G. C. Fluid exchange at the margins of dental restorations. J.A.D.A. 44:288 March 1952.

8. Coy, H. D. Evaluation of acrylic resin as a restorative material. J.A.D.A. 48:266 March 1954.

Table 1 • Clinical comparison of silicate cement and direct filling resins

Material	No. patients	No. fillings placed	No. fillings available for evaluation after 5 years	No. fillings replaced by restorations within 5 years	Recurrent caries	Giving acceptable service	Poor marginal conditions
Silicate cement	40	123	71	52	0	49	22
Direct filling resin	22	33	21	12	11	10	11

cate cement filling, it is likely to cause porosity and resultant staining. Premature finishing of a silicate cement restoration exposes an unduly reactive surface which stains readily. The shrinkage of a silicate cement on hardening also causes a slight crevice between the filling and the tooth. This crevice harbors bacteria and food debris, which discolor both the tooth and the silicate cement. The color stability of the silicate cements is notoriously poor, probably because of the absorption of stains and not from any inherent color instability.

Direct Filling Resins • When the direct filling resins were first introduced, they had a definite tendency to yellow with age; but this discoloration was later remedied by the manufacturers. Today resins have very little color deterioration and are superior to silicate cement in this respect.

COMPRESSIVE STRENGTH

Silicate Cement • The compressive strength of silicate cement is roughly one-half that of the amalgams and is a little less than that of dentin.[5] In addition to the low crushing strength, the cement is very brittle and therefore will fracture readily; this factor makes it unsuitable for restorations under incisal stress.

Direct Filling Resin • The crushing strength of direct filling resin is about one-half that of silicate cement; the resin is more elastic in nature and has a greater tendency to flow under stress. Although neither silicate cement nor the direct filling resins are suitable for use in stress-bearing regions, it seems to be necessary occasionally to give way to the appeal of esthetics and use them in Class IV restorations. In those occasional instances silicate cement is the choice because it will not sag under the stress of mastication as will the resins, thus pulling the material away from the margins and creating a field for recurrence of caries. Silicate cement will break before it will bend and, if it remains intact, will serve the purpose better (see illustration).

Class IV lesion restored with self-curing resin. Note tendency of filling material to pull away from cavity walls, under stress

ANTICARIOGENIC ACTION

Silicate Cements • The anticariogenic action of silicate cement seems to be one of its greatest attributes, although investigators do not agree on the degree of effectiveness; they do agree that it has this property to a certain extent. In the investigations carried on by McCue, McDougal and Shay,[9] they found silicate cement first in anticariogenicity whereas later investigations by Shay, Allen and Mantz,[10] listed effectiveness in the order named: copper amalgam, copper cement, gold foil, silver amalgam, zinc phosphate cement, silicate cement, inlay gold and direct filling resins. It has been established clinically that very few instances have been observed of recurrence of caries under or around the margins of silicate cement fillings. For that reason silicate cement is advantageous in mouths with rampant caries.

9. McCue, R. W.; McDougal, F. G., and Shay, D. E. Antibacterial properties of some dental restorative materials. Oral Surg., Oral Med. & Oral Path. 4:1180 Sept. 1951.

10. Shay, D. E.; Allen, T. J., and Mantz, R. F. Antibacterial effects of some dental restorative materials. J. D. Res. 35:25 Feb. 1956.

Table 2 • Clinical comparison of silicate cement and acrylic resin restorations of the same age

Filling material	Marginal seal									
	Good		Fair		Unsatisfactory		Bad		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Syntrex	102	88.7	13	11.3					115	100
Kadon	29	30.8	40	42.6	20[6]*	21.3	5[5]	5.3	94[11]	100
Sevriton	33	37.1	41	46.0	9[1]	10.1	6[6]	6.8	89[7]	100
Swedon	29	27.4	42	39.6	27[5]	25.5	8[8]	7.5	106[13]	100

*The number of fillings with secondary caries is indicated by superior figures.

The resistance to dental caries is thought to be due to the presence of fluorides in the silicate cement powder. It is believed that these fluorides may be released continuously because of the solubility of the silicate cement; thus one of the assets of silicate cements is produced because of one of its worst liabilities.

Direct Filling Resins • None of the direct filling resins has an anticariogenic effect to any appreciable degree. Their use is definitely contraindicated in any mouth with prevalent caries activity. In any mouth in which antibacterial action is of great importance, silicate cement restorations are superior to direct filling resins.

The best controlled clinical study so far reported is that of Hedegård,[11] who found no recurrent decay about silicate cement restorations after three years of observation. On the other hand, approximately 11 per cent of the direct resin fillings had recurrent caries about them. Table 2 is from Hedegård's report. This report which is given in English should be studied thoroughly by all users of direct filling resins.

PULP REACTION

Silicate Cement • There seems to be varied opinions among the investigators of the pulp damage after the insertion of silicate cement fillings.

Recently Van Huysen[12] has advanced the thought that no damage to the pulp will occur unless there is a pulp exposure. According to him pulp exposures may be so minute as to be undetected by the ordinary visual examination.

It is universally agreed, I think, that damage occurs to the pulp by all the cements using phosphoric acid.

Histological studies conducted by numerous investigators seem to establish that silicate cement placed in uninsulated cavities continues to be a source of pulp irritation from the time of insertion. This has never been satisfactorily explained, because Crowell[13] and later the research at the National Bureau of Standards[5] have shown that over a 24 hour period the acidity of leachings from silicate cements diminishes to a pH close to neutrality but always remains slightly acid. The zinc phosphate cements, which irritate the pulp less than the silicate cement does, however, remain slightly alkaline.

When the silicate cement is first introduced into the cavity, it is very acid; it is probable that at this time the greatest damage is done. Possibly enough acid is introduced into the dentinal tubules to cause permanent and continuous damage. To protect the pulp against this, it is imperative that insulation be applied to all cavities: varnish in shallow cavities and, in all cavities deeper than one-half the thickness of the dentin, a thin layer of calcium hydroxide should be applied and covered with a zinc phosphate cement base. Great care should be exercised in placing both the calcium hydroxide and the cement so as not to create any

11. Hedegård, Björn. Cold-polymerizing resins. A clinical and histological study. Acta odont. scandinav. (Suppl. 17) 13:13, 1955.

12. Van Huysen, Grant. Conservation of pulp vitality. New York D. J. 21:185 May 1955.

13. Crowell, W. S. Physical chemistry of dental cements. J.A.D.A. 14:1030 June 1927.

pressure which could force either into any minute opening into the pulp. Silicate cement should be held under pressure while setting, and a properly placed cement base prevents any pressure against the pulp at that time. It is a precautionary measure to place a layer of calcium hydroxide covered with cement in all deep cavities regardless of the restorative material used.

Direct Filling Resins • There is no general agreement among the investigators concerning the pulp reaction to direct filling resins. It is generally agreed that there is some irritation, but there is disagreement over the extent of the damage. At the Medical College of Virginia School of Dentistry, no wholesale pulp deaths have resulted from the use of resins, but to satisfy the most rigid requirements the same precautions should be used as with silicate cement.

COMMENT

Efforts are continuing through research and clinical investigations in search of a resin with better physical properties than any of the methyl methacrylate resins. A synthetic resin with a coefficient of thermal expansion close to tooth structure has been found and reported by Bowen.[14] These resins seem to be deficient in color and strength; but as they are studied, it is possible that these defects may be overcome.

SUMMARY

Silicate cement fails in meeting most of the desirable qualities of a filling material, but there is no possibility of dentists discarding its use. Their ability to match temporarily tooth structure with it and the convenience of manipulation will keep it in favor with both dentists and patients until such a time as a better material of this kind is found.

Direct filling resin has several qualities superior to those of silicate cement, but the widespread difference in thermal expansion between the resin and tooth structure, its lack of anticariogenic action and its low crushing strength limit its usefulness to a few regions in the mouth. It is superior to silicate cement only for use in mouth breathers and in Class V cavities extending beneath the free margin of the gingiva and as a facing for inlays and crowns.

Both silicate cement and, at present, direct filling resin must continue to be regarded as temporary filling materials. It must still be the goal of dental research workers to produce a cosmetically acceptable material with certain physical properties that neither now possesses.

14. Bowen, R. L. Use of epoxy resins in restorative materials. J. D. Res. 35:360 June 1956.

Religion and Science • The intellectual content of religions has always finally adapted itself to scientific and social conditions after they have become clear. . . . For this reason I do not think that those who are concerned about the future of a religious attitude should trouble themselves about the conflict of science with traditional doctrines. ***John Dewey.***

Bactericidal action and glycolytic inhibition of selected chemicals tested against oral microorganisms

I. R. Mahler, M.S., Waltham, Mass., and R. S. Manly,† Ph.D., Boston*

Several approaches toward the control of dental caries are based on the observation that dental plaque *in vivo* forms acid rapidly from sugar to develop a local acidity which is sufficient to decalcify tooth enamel.[1-3] Medicaments incorporated into mouth washes, dentifrices, lozenges and chewing gum are administered frequently to diminish the intraoral production of organic acids. Several investigators have sought substances capable of inhibiting the glycolytic cycle of oral organisms,[4-6] and others have employed bactericidal substances which reduce the number of oral organisms.[7, 8] It is possible that these two avenues of approach serve to yield the same result, and that compounds which are inhibitory toward glycolysis are bactericidal and vice versa.

Several investigators have pointed out the undesirability of prolonged use of bactericidal chemicals or antibiotics in the mouth, since such substances may upset the normal balance of the flora and result in an increased proliferation of gram-negative rods, yeast cells and mycotic forms.[9-11] Disturbances of the oral microbic equilibrium frequently lead to clinical manifestations of thrush, black tongue, or cheilitis.[12-14] Presumably the most promising inhibitors would be agents without bactericidal action.

The purpose of this study was to determine the correlation between bactericidal action of compounds and their ability to inhibit glycolysis. Eighteen organic and inorganic chemicals, some of

This study was supported in part by a grant from the United States Army, Contract No. DA-49-007-MD-471.

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1. Stephan, R. M. Changes in hydrogen-ion concentration on tooth surfaces and in carious lesions. J.A.D.A. 27:718 May 1940.

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5. Fosdick, L. S., and Calandra, J. C. Effect of some chemicals on the rate of acid formation in saliva. J. D. Res. 26:309 Aug. 1947.

6. Dreizen, S.; Greene, H. I., and Spies, T. D. Effect of in vivo addition of selected nitrofurans on acid production in human saliva. Proc. Soc. Exper. Biol. & Med. 70:558 March 1949.

7. Hill, T. J., and Kniesner, A. H. Effect of penicillin dentifrice on oral lactobacillus counts. (Abst.) J. D. Res. 26:454 Dec. 1947.

8. Ennever, J.; Robinson, H. B. G., and Kitchin, P. C. Effect of three diphenylmethane derivatives on acid production in saliva and on logarithmic growth of an oral lactobacillus. J. D. Res. 32:61 Feb. 1953.

9. White, B. J.; Kniesner, A. H., and Hill, T. J. Effect of small amounts of penicillin on the oral bacterial flora. J. D. Res. 28:267 June 1949.

10. Long, D. A. Effect of penicillin on bacterial flora of the mouth. Brit. M. J. 2:819 Nov. 22, 1947.

11. Welch, H., and others. Effect of prolonged use of penicillin tooth powder on penicillin resistance of oral microorganisms. Antibiotics & Chemotherapy 2:249 May 1952.

12. Wolfson, S. A. Black hairy tongue associated with penicillin therapy. J.A.M.A. 140:1206 Aug. 13, 1949.

13. Woods, J. W.; Manning, I. H., Jr., and Patterson, C. N. Monilial infections complicating the therapeutic use of antibiotics. J.A.M.A. 145:207 Jan. 22, 1951.

14. Tomaszewski, I., and Poznan, M. D. Side effects of chloramphenicol and aureomycin with special reference to oral lesions. Brit. M. J. No. 4703:388 Feb. 24, 1951.

which had been employed in clinical or animal tests,[15-18] were tested against saliva sediment, samples of dental plaque obtained from human mouths, and resting cells of four oral isolates.

METHOD

Three of the microorganisms, *Streptococcus mitis, Streptococcus salivarius,* and *Lactobacillus casei,* were selected because of their ability to produce acid rapidly, and their frequent intraoral occurrence. The fourth microorganism, *Escherichia intermedium,* was selected as an example of a gram-negative organism which occurs occasionally in the human mouth.

The pH levels attained by sedimented microorganisms, salivary sediment and dental plaque were studied on a recording pH meter[19] under controlled conditions of temperature, buffer capacity and carbohydrate concentration. Cells of *Str. mitis, Str. salivarius* and *E. intermedium* were harvested from 500 ml. of brain heart infusion broth incubated at 37° C. for 18 hours. *L. casei* was incubated in dextrose broth for 48 hours. Centrifuged cells, saliva sediment and plaque material (obtained from the labial and lingual surfaces of upper and lower teeth of adults), in 0.02 ml. quantities, were placed in contact with a glass electrode, Beckman #290-1, and held in place by a shaped thimble of nylon fabric that contained about 700 filaments per inch.

The pH level produced by the organisms was recorded after 20 minute immersion in a 0.1 molar glucose solution buffered to pH 7.5 with 0.01 molar sodium bicarbonate-carbon dioxide. Next the organisms were immersed for 20 minutes in glucose buffer containing the test chemical. After the solution of the chemical had been replaced by fresh glucose buffer for 20 minutes, the residual effect of the inhibiting compounds could be observed from the new pH level reached.

Inhibitory effects were expressed as percentage recovery of original activity and calculated from the ratio of the second and initial pH values. Values of 69 per cent or less with *Str. mitis* were selected arbitrarily to indicate glycolytic inhibitors.

Bactericidal activities of the chemicals were determined by adding 0.01 ml. aliquot of sedimented cells to 1 ml. of phenol red broth (Difco) containing the inhibitor or at the same concentration as was used for evaluating inhibition. After a 20 minute exposure at 37° C., two loopfuls of the broth were streaked out on blood agar plates and incubated at 37° C. for 18 to 48 hours. When no growth appeared, the compound was considered to be bactericidal.

RESULTS

Of the 18 compounds tested, seven were found capable of inhibiting acid production (Table 1). The second and third most active solution—1 per cent sodium fluoride and 0.1 per cent iodoacetate—did not affect bacterial growth, indicating that bactericidal activity is not required for interference with acid production.

The 11 remaining chemicals shown in Table 2 were found to exert slight or no inhibitory effects on glycolysis. Six of the 11 were bactericidal against the common acid-producing organisms. This signifies that bactericides do not necessarily inhibit glycolysis when in contact with a dense, concentrated precipitate

15. Fosdick, L. S., and others. A new approach to the problem of dental caries control. J. D. Res. 32:486 Aug. 1953.

16. Bibby, B. G. A test of the effect of fluoride-containing dentifrices on dental caries. J. D. Res. 24:297 Dec. 1945.

17. Dale, P. P., and Powell, V. H. Inhibition of experimental dental caries in the rat by iodoacetic acid. J. D. Res. 22:33 Feb. 1943.

18. Hein, J. W. Effect of copper sulfate on initiation and progression of dental caries in the Syrian hamster. (Abst.) J. D. Res. 32:654 March 1953.

19. Manly, R. S. Method for study of acid production by salivary sediment. J. D. Res. 33:561 Aug. 1954.

Table 1 • Compounds capable of inhibiting acid production

Compound	Conc.	Plaque	Str. mitis	Str. salivarius	L. casei	E. intermedium	Salivary sediment
1. Iodoacetamide	1%	24	29 +	24 +	39 +	38 +	34
2. 3 Phenyl-l-propanol	1% pg*	41	48 +	40 +	65 +	50 +	52
3. Copper sulfate	1%	79	69 +	71 +	85 +	73 +	61
4. N-3 aminopropyl rosin amine D diacetate	1%	70	60 +	59 +	75 +	82 +	55
5. Sodium lauroyl sarcosinate	1%	65	54 +	57 +	74 +	93 —	51
6. Sodium fluoride	1%	52	41 —	46 —	58 —	68 —	41
7. Iodoacetate	0.01%	41	46 —	45 —	41 —	42 —	40

*pg = 10 per cent propylene glycol.
+ = bactericidal
— = not bactericidal

Table 2 • Compounds not capable of inhibiting acid production

Compound	Conc.	Plaque	Str. mitis	Str. salivarius	L. casei	E. intermedium	Salivary sediment
8. 2 Ethyl hexyl 3-amino propyl ether	1%	89	83 +	68 +	71 +	75 +	—
9. Triethyl carbinol	1% pg*	88	75 +	72 +	79 +	89 +	82
10. Zephiran chloride	1:1000	84	80 +	87 +	88 +	92 +	81
11. N,N-dimethyl dodecyl amine	0.1%	100	99 +	96 +	85 +	95 +	84
12. Dodecyl tris (2 hydroxy ethyl) ammonium chloride	0.1%	80	81 +	85 +	73 +	97 +	80
13. 1, 3 diethyl urea	1%	100	98 —	99 —	100 —	99 —	100
14. Dehydroacetic acid	1%	89	86 —	84 —	97 —	100 —	98
15. 1 (o-sec. butyl-phenoxyl-2-propanol	5/2 pg	98	83 —	86 —	85 —	91 —	98
16. Nonyl carbitol	5/2 pg	100	90 —	93 —	89 —	90 —	84
17. Streptomycin	0.1 g	100	100 —	100 —	100 —	100 +	99
18. Penicillin	100 units	98	100 +	100 +	100 +	100 —	100

*pg = 10 per cent propylene glycol.
+ = bactericidal
— = not bactericidal

of microorganisms for limited periods of time. A search for inhibitors of glycolysis will probably disclose a number of promising substances which would differ in many respects from those obtained by a search for bactericides.

An interesting fact which emerged from the present study concerns the similarity of the cellular sediments in susceptibility to the inhibitors. The degree of similarity is indicated by rank order correlation coefficients[20] in Table 3 which compare the recoveries of acid production by dental plaque with the corresponding recoveries of the four microbial sediments and saliva sediment. The most representative single organism for reproducing behavior of dental plaques appears to be *Str. mitis*. Salivary sediment seems to have correlation between that of *L. casei* and *Str. salivarius*. The value of these findings is the indication that *Str. mitis*, salivary sediment, *L. casei* and *Str. salivarius* could be employed as reliable technics for primary screening of substances which are potentially inhibitors of glycolysis in dental plaque. Any suitable substitute for plaque material is valuable since it is rare to find an individual who can furnish more than 20 microliters of dental plaque every two days.

Table 3 • Resemblance between dental plaque and other test materials in susceptibility to inhibitors

Dental plaque versus	coefficient*
1. Streptococcus mitis	.951
2. Streptococcus salivarius	.924
3. Salivary sediment	.922
4. Lactobacillus casei	.864
5. Escherichia intermedium	.754

*Rank difference correlation coefficient

$$\rho = 1 - \frac{6\Sigma D^2}{n(n^2-1)}$$

CONCLUSIONS

Eighteen compounds have been examined for comparative bactericidal action and ability to inhibit acid formation *in vitro*. Under the testing conditions, no association was found between glycolytic inhibition and bactericidal effect. Plaque material, saliva sediment and cultures of four oral isolates showed great similarity in susceptibility toward the chemicals tested. The behavior of *Str. mitis* most closely resembled the behavior of natural dental plaque.

20. Guilford, J. P. Fundamental statistics in psychology and education, ed. 2. New York. McGraw Hill, 1950.

Science and Common Sense • Science is nothing but trained and organized common sense, differing from the latter only as a veteran soldier may from a raw recruit. The methods of science differ from those of common sense, only as the Guardsmen's cut and thrust differ from the manner in which a savage wields his club. *Thomas H. Huxley.*

F.D.I. representative suggests extension of dental program for WHO

C. Willard Camalier, D.D.S., Washington, D. C.

The Fédération Dentaire Internationale is interested in improving dental health conditions throughout the world and has the wholehearted support of its member organizations, one of which is the American Dental Association. Much progress has been made in this part of the world, primarily because of the activities of the American Dental Association, and although emphasis has been placed on the education of parents and children in the best methods of caries prevention, and on research, it is felt that emphasis on some of these problems by the World Health Organization would have a most stimulating effect. Therefore, I have the honor to suggest a few broad principles in the hope that this great organization will put emphasis on these areas to the end that the dental health of the people of this section of the world and of the entire world may be improved.

1. An expanded program of dental health education in the schools, as a part of the general program of health education in order to develop a better appreciation of the benefits of total health.

2. An extension of the present program of dental research in order that the nature of dental disease may be understood better and effective preventive dental public health measures developed and applied.

3. The expansion of the program of fluoridation of communal water supplies, an effective public health measure which has been demonstrated as a safe method for reducing the incidence of dental decay by 60 per cent.

4. An expansion of the program for the use of safety devices designed to protect the face and teeth and other oral structures of youths engaged in such sports as football, hockey, baseball and boxing.

Presented before the IX regional meeting of the World Health Organization, Washington, D. C., September 16-27, 1957.

Assistant secretary, American Dental Association.

Radiation Hazards • Oversimplification of the problem of ionizing radiation and the frightening of an entire population into panicky efforts to protect their "genetic legacy" by covering over their gonads every time an x-ray film is taken is not only unjustifiable but also delusory.

Likewise, to infer that if one adds the roentgens from successive radiographic examinations, treatments and accidental exposures, and that if this total exceeds a certain predetermined figure, life span will be shortened is an unproved assumption but one that has apparently, although erroneously, been attributed to the reports from the National Academy of Sciences. *O. S. Peterson, Jr., M.D. Radiation Hazards. I. Radiation Hazards in Medical Practice. New England J. Med. 257(16) 756 Oct. 17, 1957.*

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LON W. MORREY, D.D.S., EDITOR
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THE Journal OF THE AMERICAN DENTAL ASSOCIATION

Editorials

The layman looks at dentistry

This month's issue of THE JOURNAL carries the fourth and final installment of a study conducted for the Association by Social Research, Inc., on the patients' opinion of dentists and dentistry. The principal purposes of the study were to uncover, rather than to measure, the attitudes of the general public toward dentistry and to determine the reasons for dental neglect. The material was gathered through depth interviews with 126 men, women and children. Although all of the findings must be used with caution, some of the material uncovered is fascinating in its implications. Since the dentist can never know too much about his patients, this series of four reports is recommended reading.

The study points up a number of interesting differences in the attitudes and practices relating to dental care adhered to by members of different social, age and economic groups. Some 82 per cent of the upper middle class respondents, for instance, saw a dentist once a year or more, whereas only 6 per cent of those in the lowest class grouping saw a dentist each year. The class attitudes toward dentistry, if validated by a large-scale study, indicate that dental health education must be addressed to separate groups, each having its own style of life and set of attitudes.

Pertinent for dental health educators are some of the observations on the ritual aspects of dental care, and on the attitudes which seemingly work against public concern with dental care. Some of the respondents apparently still believe that luck is a determining factor in dental health, and that "people are born with either good or bad teeth—and there's nothing you can do about it." Another factor working against dental care is the feeling that caries and loss of teeth are inevitable.

Despite the erroneous impressions of dental health occasionally expressed by the less educated respondents, the report indicates that the dental health education program which the Association has conducted for many years has been fairly effective.

The basic rules of good dental health, the study indicates, today are understood by most people. It is equally gratifying to note in the report that the dentist and the dental profession have a high status in the minds of most people in all walks of life.

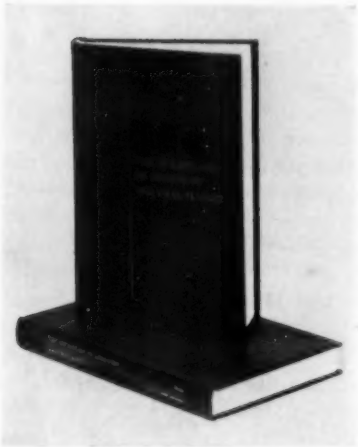
Although none of the findings reported by Social Research, Inc., can be considered indisputable, many seem to be hypotheses that merit further research, testing and elaboration. It is hoped that a full-scale investigation of some of the hypotheses will be conducted.

Salute to the new Journal of the Maryland State Dental Association

This month THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION salutes the latest constituent dental society publication to enter the field of dental journalism—the *Journal of the Maryland State Dental Association*. The thirty-seven other state dental periodicals, in keeping with the old saying that "a man is known by the company he keeps," are proud to keep company with Maryland's new magazine because of the quality of its contents and the high character of its format. Editor L. W. Bimestefer, his editorial board and all others who have had anything to do with the development of the publication are to be congratulated on the excellence of the first issue.

The part played by dental journals in continuing education cannot be overemphasized. No graduate student ever left the halls of his dental school so brilliant, so educated, so skilled that he could close the door on his education as he closed the door on his alma mater. The successful dentist, as G. V. Black once said, never ceases to be a student. Changes occur constantly in the practice of dentistry. Changes occur constantly in society that affect the practice of the profession. One of the principal means of keeping informed of those changes is by reading. "A man is known by the company he keeps." The dentist who keeps company with his scientific publications becomes an informed dentist and an informed dentist becomes a better dentist—more valuable to his patients, his community, his profession and himself.

Although serving as a channel of communication between a dental society and its members would seem to be sufficient to justify the publication of a periodical, there is another major justification for a state dental journal. A journal provides one of the principal means of contact between a professional organization and other professions and the public. In a sense a journal serves as a show window displaying to others the wares of the organization—its objectives, activities and its services. If the display is in good taste, artistic as well as articulate, the public receives a good impression of the sponsoring agency. On the other hand, if the display is unkempt, cheap and shoddy, the public is inclined to feel that its owner is of like caliber. "A man is known by the company he keeps." And a dental society that keeps a highly qualified publication becomes known as a highly qualified organization, one that merits the esteem of fellow professions and one that warrants the respect of the public. The new *Journal of the Maryland State Dental Association* falls into that category. In congratulating again those who have borne the burden of its launching, THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION hopes that every Maryland member will give the publication his full support so that it, in turn, can fully support the members.



An educational approach to better nomenclature

The Vocabulary of Dentistry and Oral Science, the new book on dental terminology just published by the American Dental Association,[1] is unique among works devoted to the technical language of sciences and professions. Previously, innumerable glossaries, vocabularies, and dictionaries, in all sorts of specialties, including dentistry, have been issued by societies and commercial publishers. All of these, however, have consisted of lists of terms, issued frequently with the mandatory authorization of the sanctioning body. These glossaries tell the reader categorically what terms he may use and how he may interpret them, but they do not satisfy his desire to know why some words are prescribed and others are proscribed. Like most such imposed measures, these pronouncements have generally been ineffective and frequently, in the professions, have largely been disregarded.

The new book, by George B. Denton, Ph. D., research consultant of the Bureau of Library and Indexing Service of the Association, has a new approach. It is not primarily a glossary, although a selected list of words with critical discussions is appended. The book analyzes the characteristics of various systems of scientific nomenclature, presents the principles of composition of technical words, and surveys all the factors that influence the creation of professional terms. The applications of these generalities of terminology, abundantly given throughout the pages of the book, are all examples from the fields of oral science and dentistry.

The discussion is carried on from an educational point of view. The requisite materials for independent study by the individual are supplied, and these should enable the reader to learn for himself the rationale of existing words in his field, and to construct, when necessary, new technical terms. Dr. Denton has resorted to categorical judgments only when terms are flagrantly below the standard of good usage and good sense. The book is based on the assumption that it will be more effective in furthering better and more uniform usage in den-

tal terminology if it provides the dentist with the means for discovering for himself why certain terms that he encounters are better or worse than their synonyms.

These features of the book make it particularly adapted to the dental student and teacher. It is to be expected that the terms which the dentist has learned in school will for the most part persist in his vocabulary throughout his career as a practitioner. In order to furnish the student with the opportunity to develop skill in the study of words, problem exercises are supplied in the chapters on writing definitions, choosing terms, and coining words.

The book should also be especially useful to editors of dental journals, dental librarians, and authors of articles for periodicals.

Aside from any appeal the book may have for the dentist, it should have some interest for other workers—especially those in the health professions such as physicians, surgeons, public health officers, nurses, and pharmacists. The principles of choice and composition of words are the same; and although the examples are almost exclusively dental, members of the other health professions could profitably employ this book until some analogous work is produced closer to their needs.

The subject matter applies, too, to many of the biological sciences, especially anatomy, histology, and bacteriology. Perhaps even the general philologist and semanticist, as well as workers in the science of linguistics, might find that a dip into this specialized realm of technical terminology would discover new applications and exemplifications of the general principles of language development.

The book does not pretend to be the last word on the subject with which it deals; and it is to be expected that the book will give rise to even more questions and problems of terminology than it attempts to answer. The reader who studies the principles and resources of word formation as set forth in the book will be better equipped to solve his problems of nomenclature himself.

1. Association issues book on nomenclature by Denton. J.A.D.A. 56:711 May 1958.

Cases and Comments

AN EVALUATION OF POSTERIOR BITEWING ROENTGENOGRAMS

Fred S. Fink, U. S. Army, and Horst F. A. Schmidt, Dr. med. dent., Bad Hersfeld, Germany.*

In the early part of 1957, the Army initiated the use of a new service dental record. This necessitated complete oral examinations of all military personnel. In the clinic located in Bad Hersfeld, Germany, 678 men were examined. Their ages ranged from 18 to 38 years, with the average age being estimated at 23. This opportunity was used to evaluate the importance of the bitewing roentgenogram.

The following method of examination was employed: A mouth mirror and explorer examination was made on every patient, and carious teeth, missing teeth and other observations were noted and charted on the new service dental records. Posterior bitewing roentgenograms then were taken of these patients, and the additional carious lesions were noted on their charts when found. The x-ray films used were Kodak bitewing films and Minnax normal dental x-ray film. Most of the film used was the Minnax brand.

The results of the bitewing roentgenographic examinations were as follows: Of the 678 men examined, no carious lesions were revealed by the roentgenograms in 301 men (44.4 per cent), one carious lesion in 170 (25.08 per cent), two carious lesions in 94 (13.86 per cent), and three or more carious lesions in 113 men (16.66 per cent).

These results show that, of the 678 men examined, in less than 44.4 per cent did the mouth mirror and explorer examination reveal all carious posterior teeth. The remaining 55.6 per cent of the men examined had carious teeth which were not apparent on examination with a mouth mirror and an explorer.

The importance of bitewing roentgenographic examination as an adjunct to mouth mirror and explorer examination should also be evaluated with respect to other clinical conditions which may be present. In instances of interdental spaces that are large enough for the dentist to make an adequate examination with an explorer, bitewing roentgenograms may not be required. This, however, should not rule out routine bitewing roentgenographic examinations, as unsuspected pathologic conditions may be discovered.

Since 55.6 per cent of the men examined had carious lesions which were revealed by bitewing roentgenographic examination and these men were in the age group of so-called decreased caries susceptibility, it seems reasonable to suppose that in everyday dental practice in which patients of all ages are seen this percentage would be higher.

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MOUTH PROTECTOR PROJECT FOR FOOTBALL PLAYERS IN PHILADELPHIA HIGH SCHOOLS

By Abram Cohen, D.D.S., and Albert L. Borish,† D.D.S., Philadelphia.*

Shoulder pads and helmets are considered required equipment for high school pupils engaging in football, but the use of a mouth guard is optional with the player. The general type of mouth guard is bulky and easily displaced. This probably accounts for the limited number of mouth guards in use by contestants and, therefore, accounts for the increased number of dental injuries in this contact sport. In the past three years a fitted type of mouth guard has become required equipment for many college squads, with a resultant drop in the number of tooth and mouth injuries.

In order to protect high school pupils engaged in contact sports, particularly football, a research project was established in September 1957 by the dental division and the division of physical health and education of the Philadelphia Board of Public Education. Two squads were selected, and all players (42 on each squad), were equipped with individually fitted mouth guards by the dental personnel of the Philadelphia Board at the postgraduate clinic of Temple University School of Dentistry. It was agreed with the physical education department that the coaches would insist that these guards be worn in scrimmage as well as in actual games.

The varsity squads of 17 Philadelphia high schools reported a total of approximately 680 boys participating in football (each varsity squad consisted of approximately 40 boys). Of

Members of football squad of Central High School in Philadelphia who were fitted with mouth protectors included (l. to r.) Robert Curtis, Richard Kramer, Jay Gubernick, Adolph Gaigalas and Warren Dolphin

these 17 schools, the players in 15 either wore no mouth protectors or used the general type which are purchased ready made. The other two squads wore fitted guards which were prepared for each boy prior to the opening game.

The breakdown of the injuries reported was as follows: Of the 84 boys who wore fitted mouth guards, none sustained either tooth injuries or head and face injuries. For the 596 boys who wore no guards or general type mouth guards, 21 tooth injuries and 26 head and face injuries were reported.

The following observations were made on the basis of the study:

1. A helmet with a face bar offers little protection. In a number of the instances of tooth injury reported, the player wore this type of helmet.

2. Position played appears to have no correlation with injuries. Injuries were found to be well divided among all positions.

3. One coach remarked that a mouth protector is not feasible for a quarterback and that a face guard should be worn. The fitted mouth protector, however, gives the player freedom to speak, to rinse his mouth or to drink water. Special attention was given in fitting quarterbacks with mouth protectors to allow them to speak, and the boys were pleased in every instance.

4. One coach remarked that the number of injuries was less than normal for the year, although only face protectors were used by his players. He reported only one injury and stated that four to five injuries usually occurred in a year.

5. The coach of one of the squads using fitted mouth guards reported no serious injuries to the head. He said, "One boy had a sore jaw from a forearm blow. Two boys had very mild concussion which required no hospitalization."

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International Correspondence

NEWS FROM GREAT BRITAIN

Arrangements are now well in hand for the annual conference of the British Dental Association to be held from July 7-11 at Dundee, Scotland. Accommodations are being taken quickly, and there is every indication that an enjoyable meeting will be held in this unique Scottish town. Among the social events will be a reception by the University of St. Andrews.

Dundee lies on the north side of the Tay, and St. Andrews on the south, and arrangements have been made for crossing the river by a special train. St. Andrews University was the first university to be founded in Scotland and is the third oldest in Great Britain.

There is no doubt that Dundee, set in the heart of charming country and with historical and academic attractions, will provide a background of great interest for those who visit it during the coming conference.

DENTISTS' REMUNERATION

The British Dental Association gave evidence before the Royal Commission on Doctors' and Dentists' Remuneration on March 20 and 21. The chief spokesman for the association was Lionel Balding, chairman of the Council, and it is obvious from the quite full report of the proceedings in the April 1 edition of the *British Dental Journal* (pages 249-252) that the case for the dental profession was presented forcefully by Mr. Balding. The full report of the questions put by members of the Commission and the replies should prove to be extremely interesting reading.

METHODS OF ELECTION TO GENERAL DENTAL COUNCIL

When the Representative Board met in January, the Council reported that they had taken the opinion of an Oxford University expert on electoral systems with regard to the virtues of the method of election to the General Dental Council by single transferable vote as compared with the simple majority vote system.

The expert advised that, in the absence of any "party" system within the dental profession, the majority vote method would probably produce very much the same result as an election with the transferable vote method. He said, however, that if an organized minority ever developed within the profession, the simple majority system might not be safe to employ, for it could be rigged to produce unrepresentative and undesirable results. The transferable vote system, on the other hand, had no mechanical or mathematical flaw which could produce freak or unfair results.

In the light of this advice, the Representative Board, to confirm the decision of the Council, decided not to make further representations to the General Dental Council against the use of the transferable vote system at elections to that Council.

SCHOOL DENTISTRY

The dental section of the principal school medical officer's annual report to the Staffordshire County Council, prepared by F. C. Winter, is interesting. Of the 51,500 children receiving dental inspection, 7,704 were attending for emergency treatment. Of those who received inspection, 37,629 were found to have defects, and, after the children with very minor defects and the many who were treated privately were eliminated, consent forms were issued to 29,595, with an acceptance rate of 88.9 per cent.

Again, notice was given to the authority that the rate of caries incidence cannot be overtaken by curative measures under present staff conditions, nor can it be envisaged that recruitment of either fully qualified or auxiliary personnel during the next ten years will be sufficient to cope with the rising tide of dental disease.

There is a side light on the social changes which have affected the country as a whole. The popular fallacy which for so long has credited rural children, fed from the garden and the pig, with better teeth can no longer be maintained. With urban indulgences readily at their disposal, if anything, their dental conditions are even worse than those of city or town children.

Mr. Winter gives sufficient statistical evidence to support his hope that the actual peak in the incidence rise has been reached and that the incidence probably will not be maintained at the present level. What does present the real problem is the poor dental condition of the new entrants to school life.

HISTORICAL NOTE

A meeting of the Odontological Section of the Royal Society of Medicine under the presidency of G. T. Hankey was held on March 24, 1958, and the following historical minute was read:

"Odontological Society of London, Resolution of Council, Wednesday 31st March, 1858.

"That it is the opinion of this meeting that pending that final answer from the College of Surgeons, to the Memorials that have been presented to that body, (which it leaves to the Council to urge in such a way as in its discretion may seem best), a School be formed, for teaching those branches of science appertaining peculiarly to the practice of Dentistry, which are not taught in the existing Medical Schools, and that the Council be requested to draw out the plan of such a School, and to be empowered to open it as soon as circumstances permit."

J. Menzies Campbell, famed dental historian, gives the following additional information about this important event of 100 years ago. The Dental Hospital of London was opened through the instrumentality of the Odontological Society of London on December 1, 1858. The London School of Dental Surgery (attached to the hospital) was by September 1859 "organized" to conform to the charter of the Royal College of Surgeons of England, and its opening date was announced as October 3, 1859. Subsequently, these became the Royal Dental Hospital of London and School of Dental Surgery.

INTERNATIONAL ASSOCIATION FOR DENTAL RESEARCH

Prof. Martin A. Rushton, Councilor of the British Division of the International Association for Dental Research, has sent the following report of the sixth annual meeting, held by invitation at the Sutherland Dental School, Newcastle upon Tyne, on April 10 and 11.

The Division now has approximately 60 members, and contains a steadily increasing number of young research workers. At the business meeting it was announced that the next annual meeting will take place at Manchester on April 9 and 10, 1959. It was also announced that the Colgate-Palmolive Company had offered to institute an annual prize for the encouragement of young dental research workers. It was decided that this offer should be gratefully accepted and that regulations should be drawn up somewhat on the lines of those governing the E. H. Hatton prize awarded at the annual meetings in the United States.

Ninety-two members and visitors attended the scientific sessions, at which 40 papers and demonstrations concerning almost every branch of dentistry were given. The annual dinner and other social engagements were attended by high officers of the university and of the Faculty of Medicine, and these events offered a valuable opportunity for informal discussion of educational and research problems.

The British Division has contributed a closely reasoned paper to the memorandum on dental research in the United Kingdom which is being prepared for publication by the British Dental Association. The position of the dental research worker in the period of recurring financial crises and slow reconstruction of damaged and obsolete departments since World War II has been one of considerable difficulty, which has been overcome partly by enthusiasm and improvisation. The Division's paper expresses the viewpoint of those actually engaged in the work. Although some features of the paper are of special local interest, many of the problems discussed are the same as those which face dental research workers in other parts of the world.

One local problem is the scarcity of dental research fellowships. An important contribution has now been made by the Nuffield Foundation, which has done so much already by means of scholarships and fellowships to assist outstanding candidates to fit themselves for careers in dental teaching and research. The new Nuffield dental research fellowships are intended for graduates in dentistry and science or, exceptionally, in science only and are tenable for three years. They are open to citizens of countries in the British Commonwealth. The first appointment made was that of Dr. A. G. Leaver, who has worked for the Medical Research Council of New Zealand and who will hold his fellowship while working with Dr. R. L. Hartles in the department of biochemistry at the Dental School of the University of Liverpool.

ITEMS OF INTEREST

New Scholarship Fund • In the advertisements section of the *British Dental Journal* appears an announcement of the Amalgamated Dental Company scholarship fund, the terms of which have some interesting features apart from the fact that this fund is provided from commercial sources.

The scholarship fund is to assist students of dentistry, preferably relatives of dentists, and will amount to £250 per annum for the full period of the course. Four scholarships

will be given, one each to a student from London, England, Scotland and Wales. The British Dental Association is advertising the scholarship. This is a new and commendable project in Great Britain.

Marsh Dies • The many friends and colleagues both in Great Britain and overseas will regret to learn of the death of Leonard Russell Marsh, the well-known orthodontist who devoted much time to the affairs of the European Orthodontic Society. His passing at the age of 58 years quickens the memory of his achievements, his wide interests and his quiet humor. Sympathy is felt for his wife, two sons and daughter.

New Librarian • Every success is wished by the members of the British Dental Association to Miss Jean Kershaw who has commenced her new duties as librarian. The library at the association's headquarters is small but extremely well stocked and is a source of great pride to the association.

Orthodontic Group • The British Society for the Study of Orthodontics celebrated its 50th jubilee in May. A two-day conference was held at the Eastman Dental Hospital, London, and the program consisted of papers and table clinics presented on May 9 and May 10.

G. H. Leatherman,
D.M.D., F.D.S., R.C.S., F.A.C.D.

NEWS FROM AUSTRALIA

Henry Beyron of Stockholm, Sweden, immediate past-president of the Swedish Dental Society and a lecturer who is well known to members of the American Dental Association, was in Australia for several weeks during the early part of the year.

After spending some time in Central Australia for the purpose of studying the aborigines at Yuendumu settlement, Dr. Beyron returned to South Australia to carry out further research at the Dental School of the University of Adelaide. He then conducted postgraduate classes and lectured in Melbourne, Sydney and Brisbane before members at general meetings of state branches. The classes and lectures were very well attended, and their exceptionally high standard reflected Dr. Beyron's many years of scholarship and research.

Before leaving for America, Dr. Beyron donated to the Australian Dental Association for research purposes the sum of $500, representing the greater part of the honorariums he received for conducting postgraduate classes in Australia. He stipulated that the money be awarded to an Australian dentist for an original research project to be carried out in Australia.

SUPERANNUATION OF SELF-EMPLOYED PERSONS

In Australia, as in many other parts of the world, negotiations for a new deal for self-employed persons have continued. Unfortunately, however, despite frequent representations by the professions, the government of the Commonwealth of Australia considers that it would not be in the best interests of the economy to give tax reductions or concessions at the present time. Consequently, endeavors in this direction in Australia have not met with the same degree of success as have those in Canada, England and the United States.

Despite continued disappointment caused by the repeated rejection of their representations, certain professional bodies are now investigating other possible avenues. The British Medical Association is endeavoring to have the allowable insurance rebate increased, and the Law Institute is investigating the establishment of superannuation investment trusts.

Within the Australian Dental Association the establishment of such trusts has received consideration by two state branches and in one instance has created sufficient interest among members to warrant the appointment of trustees who are now working in conjunction with the economics subcommittee of the branch in drawing up a basis for the trust deed, that will govern the operations of the plan, which is expected to be in full operation before the end of this financial year. It is realized, of course, that such a scheme will provide only a partial solution of the problem.

CIVIL DEFENSE SCHOOL FOR DENTISTS

As the result of negotiations by the Australian Dental Association, 28 dental practitioners from all states of the Commonwealth recently attended a four-day civil defense school at Mount Macedon, Victoria. This was the first school of this nature to be held in Australia at the instigation of any association or similar body.

The intensive schedule provided, by means of lectures, films and demonstrations, a complete and balanced picture of the devastation which may be expected in a city from the ex-

plosion of a nuclear weapon. Methods of self-protection and the whole problem of civil defense were also considered. At the conclusion of the lectures, the students were divided into three groups to discuss the following problem and to provide answers to the following questions:

Problem. In the event of a nuclear attack it is evident that there will be a grave shortage of medical personnel, equipment and drugs. A Medical Study Period suggested that the shortage of doctors could be mitigated by dentists' undertaking medical duties:

1. What in your opinion should be the role of the dentists in a civil defense emergency?
2. To what extent do you consider the suggestion of the Medical Study Period to be feasible?
3. How could dental assistants and nurses be best employed?
4. What action (if any) could be taken at the present time to facilitate the integration of the dental profession in civil defense?

Regarding the use of dental personnel in such a civic disaster, the following recommendations were made at the conclusion of the deliberations when the students in the three groups met together under the chairmanship of the commandant:

1. That dentists be used as medical officers in the areas of greatest casualty, in the event of a shortage of medical personnel, to assist with first-aid measures, the administration of sedatives, blood transfusions and other procedures and the general assessment of casualties.
2. That through the state branches of the Australian Dental Association courses in advanced first aid should be considered and conducted with the assistance of the medical profession.
3. That although the dentist, of necessity, would assume the role of a medical officer in areas close to the center of complete devastation, he should revert to his more specialized sphere in the treatment of maxillofacial and jaw injuries as the casualties and dental personnel are evacuated to the base hospitals in remote areas.
4. In the temporary hospitals and casualty clearing stations set up at intervals along the evacuation routes, the dentist could be of use in the fields of radiology, minor and temporary surgery and anesthesia.
5. That dental nurses or attendants be used as nursing aides in base hospitals and as assistants to medical and dental personnel near the site of devastation and in welfare centers in the stricken areas.

The final recommendation of the students was that consideration be given to the stockpiling of dental materials and equipment in safe areas.

Margaret Hjorth

ASSOCIATION SUPPORT OF NIDR BUILDING APPROPRIATION, INCREASED RESEARCH GRANTS IS VOICED IN SENATE HEARINGS

The need for the construction of a building for the National Institute of Dental Research was stressed by Association representatives who testified May 14 before the Senate subcommittee on appropriations for the Departments of Labor and Health, Education and Welfare. The House of Representatives approved the building funds in March.

Thomas J. Hill, chairman of the Council on Dental Research, also urged an increase from $2,825,000 to $3,825,000 in the appropriation for research grants to dental schools in hearings before the subcommittee, which is headed by Senator Lister Hill of Alabama.

Floyd W. Pillars, vice-chairman of the Council on Legislation, expressed the Association's support of an appropriation of $3,700,000 for construction of the dental institute building.

Forand Bill • An opportunity to offer testimony before the House Ways and Means Committee on the Forand Bill (H.R. 9467) and other similar measures, as well as on proposed amendments in the Social Security Act, was requested by the Council on Legislation. Hearings were expected to be held in late May or early June.

At their March meeting, the Board of Trustees adopted a policy statement opposing the Forand and other similar plans.

Aid to Dental Schools • The House Subcommittee on Health and Science was expected to vote during the month of May on one of three similar proposals which would authorize grants-in-aid to dental schools for construction of research and teaching facilities.

Representatives of the Association and the American Association of Dental Schools gave testimony supporting a five-year $50,000,000 plan of matching grants to dental schools at House hearings in late April.

Unemployment Compensation • According to Bernard J. Conway, secretary of the Council on Legislation, it is expected that the proposed amendments to the federal Unemployment Compensation Act will not affect dentists, since the proposal, which would have extended the payment of the federal tax to employers of one or more persons, did not receive approval in the House of Representatives. The existing law makes the payment of the federal tax mandatory for employers of four or more persons.

Aid to Schools of Public Health • The House passed a bill (H.R. 11414) providing approximately $1,000,000 in grants to 11 schools of public health to assist in the cost of educating physicians, dentists, and other public health personnel assigned or to be assigned to federal government public health agencies.

The Council on Legislation notified the Interstate and Foreign Commerce Committee of the House that the proposed aid plan was in conformity with the policy of the Association favoring the use of federal funds to aid dental education programs. A significant number of dentists are trained for governmental positions in the field of dental public health through these schools.

HEADQUARTERS ESTABLISHED FOR SURVEY OF DENTISTRY

The two-year survey of dentistry which is being carried out by the American Council on Education will be conducted from headquarters which were recently established at 700 N. Michigan Ave., Chicago 11.

Byron S. Hollinshead, Ph.D., director of the survey, has been assembling a staff and preparing a work plan for the survey. The work plan will be presented for approval to the Commission on the Survey of Dentistry, which is scheduled to meet June 18-19 in Chicago.

Arthur S. Flemming, Ph.D., chairman of the commission and president of Ohio Wesleyan University, was named by President Eisenhower in early May to succeed Marion B. Folsom in the cabinet post of Secretary of Health, Education and Welfare. As THE JOURNAL went to press senate confirmation of the appointment was expected.

COUNCIL TO PLAN STUDIES ON DENTAL PRACTICE

An intensive study of dental practice is to be undertaken under the direction of the Council on Dental Health, according to Jay H. Eshleman, chairman of the Council of the American Dental Association.

At its meeting May 1 and 2, which followed the conclusion of the Ninth National Dental Health Conference, the Council approved the development of a prospectus which would delineate the basic areas of dental practice that should be investigated. The prospectus also would indicate the type of studies which would yield the most valuable information for increasing the efficiency of dental practice, thereby, making more dental care available to more people.

Dr. Eshleman also said that the Council hopes to gain the cooperation of agencies within and without the Association that are interested in various areas of dental practice.

The interest of the Council in dental practice was also reflected in the program of the Dental Health Conference, which was held April 28-30 in the Central Office. The three major subjects treated in the talks on the opening day of the conference were also the topics discussed in the workshop sessions on the last two days.

The reports of the workshop groups do not necessarily coincide with the policies of the Council on Dental Health, but they do reflect some of the ideas that were prevalent among the conference participants.

The group which discussed factors relating to the determination of dental fees felt that the development of uniform methods for fee determination which could be adapted to all types of dental practice would be desirable. The group emphasized the need for investigation and the dissemination of information concerning the various areas of dental practice.

One workshop group made practical suggestions concerning the use of the State Dental Division Program Survey and Cost Estimate Form, which was developed by the Council and the American Association of Public Health Dentists. The group pointed out that the information that would be obtained would be valuable as a guide to long range planning of a dental division's programs, in justifying the needs of the dental division before state legislatures and agencies of the federal government. The information also would stimulate more effective dental society support for needed expansion and fund increases for the state dental public health program.

Government programs for dental care were considered by a third workshop group. This group reported that "the securing and maintenance of dental health for recipients of public assistance is important; and, of no less importance

NINTH NATIONAL DENTAL HEALTH CONFERENCE

April 28-30, 1958

Program participants on the opening day of the Conference included (seated, l. to r.): Jay H. Eshleman, chairman, A.D.A. Council on Dental Health; Lynn Temple, Springfield, Mo.; William P. Brust, member, A.D.A. Council on Dental Health; and (standing, l. to r.) John M. Frankel, San Francisco; T. Leroy Martin, Ph.D., Chicago; Mr. Robert L. Jorgensen, Chicago; David B. Ast, Albany, N. Y.; Harry M. Klenda, Wichita, Kas.; James B. Bush, Iowa City, Iowa; Harold Hillenbrand, secretary, American Dental Association; Hal Christensen, assistant secretary, A.D.A. Council on Legislation; and Bernard J. Conway, secretary, A.D.A. Council on Legislation.

Participants in the Ninth National Dental Health Conference conducted by the Council on Dental Health of the American Dental Association are shown during a general session in the board room of the Central Office. Talks on various phases of practice administration and factors in the determination of fees, on the program of the state dental division and on government programs for dental care were presented on the opening day. On the second day participants divided into three groups for workshop sessions, with group reports being given on the final day of the Conference.

than for any other segment of the population. . . ." The report also stressed the importance of the role that could be played by constituent and component societies in developing, initiating and providing guidance for dental programs for recipients of public assistance.

FORUMS TO BE FEATURES OF 1958 SCIENTIFIC SESSION

The essay program at the 1958 scientific session in Dallas will consist mainly of group presentations, such as forums, panel discussions and round table discussions, which were popular features of the scientific program at the 1957 annual session in Miami, according to David J. Fitzgibbon, chairman of the Council on Scientific Session.

The forum, which was first used as part of the scientific program at the Miami session, is similar in format to the refresher course and offers more comprehensive coverage of the subject than the individual essay. Five forums will be presented in Dallas. Four of these will last one day and the fifth will be a two-day presentation.

Eight panel discussions, two round table discussions, a clinical lecture and individual essays round out the essay program.

Motion pictures are to be presented on three of the four program days. Television clinics, projected clinics, table clinics and exhibits will complete the scientific schedule.

Dental practice will be the subject of the two-day forum. The presentation, in four half-day sessions Tuesday and Wednesday, November 11 and 12, will be on "The Efficient Dental Practice," "Efficient Use of the Chairside Assistant," "Clinical Evaluation of New High-Speed Equipment," and "Paying for Dental Services." There will be five panel participants and a moderator for each half-day session. The four moderators will be William R. Mann of Ann Arbor, Mich., Rulon W. Openshaw of Los Angeles, Rex Ingraham of Los Angeles, and Harold J. Noyes of Portland, Ore.

On Monday, November 10, "Periodontics in Everyday Practice" will be the subject of a day-long forum, with Harold G. Ray of San Francisco as moderator. Fifteen-minute papers will be presented by five men during the morning session and five during the afternoon session. Each session will conclude with group discussion.

The scientific program will be held in the air-conditioned Dallas Memorial Auditorium.

PETERSON TO ATTEND SESSION OF WHO COMMITTEE IN GENEVA

Dr. Shailer Peterson, secretary of the Association's Council on Dental Education, will serve as a member and as recording secretary of the Expert Committee on Auxiliary Personnel, which will meet in Geneva, Switzerland, June 30 to July 5 under the auspices of the World Health Organization.

Dr. Peterson will be the only panel participant from the United States. The invitation was issued by Carl L. Sebelius, dental health officer of WHO.

The committee will discuss the use of all types of auxiliary and ancillary dental personnel in the various countries of the world.

COUNCIL SUGGESTS PROGRAM OF STUDENT RECRUITMENT

A manual on recruiting young people for the profession of dentistry has been prepared by the Council on Dental Education and has been sent to presidents and secretaries of all component dental societies, with copies of the Council's new brochure, *Careers in Dentistry*.

The manual, entitled *A Dental Student Recruitment Program for Local Dental*

Societies, outlines specific projects which would call attention to the advantages of dentistry as a career.

Harold W. Oppice, chairman of the Council, emphasized the present competition for young people with scientific interests in his letter to the component society secretaries and presidents. He said, "Everyone can help dentistry meet its competition for the finest of our young people who are, at this very moment, choosing life-time careers." He urged every component society to develop an active recruitment program.

NUMBER OF DENTISTS IN U. S. REACHES 100,534 STUDY SHOWS

The dentist-population ratio in the Southeast, and the Southwest became more favorable during 1957, according to figures released in early May by the Bureau of Economic Research and Statistics of the Association. The number of dentists, both active and retired, in the nation as a whole reached 100,534 in 1957, an increase of 1,207 over the number in 1956.

The national ratio worsened with one dentist per 1,679 persons in 1957, as compared with one per 1,671 in 1956. Over 600 more dentists would have been required to maintain the dentist-population ratio at the 1956 level.

The ratios became more favorable in 1957 in the Southeast, the Southwest and New England. The 1957 ratio in the Southeast was one dentist per 2,988 of population as compared with one per 2,990 in 1956.

The ratio in the Southwest now stands at one dentist per 2,935 persons as compared with one per 2,944 in 1956. The improvement in the ratio in New England is surprising, in view of the fact that New England has a more favorable ratio than other regions with the exception of the Middle East.

The supply of dentists in relation to the population improved in 14 states and the District of Columbia during the year ending in mid-1957, whereas it worsened in 34 states during the same period.

A.D.A., COLLEGE OF RADIOLOGY SPONSOR X-RAY MANUAL

The American Dental Association and the American College of Radiology have co-sponsored the publication of a booklet, *A Practical Manual on the Medical and Dental Use of X-Rays with Control of Radiation Hazards.*

One part of the 31-page manual is devoted to dental roentgenography, and the Council on Dental Research recommends that every dentist have a copy of the booklet readily accessible in his office. The part on dental roentgenography outlines in simple language the basic considerations for radiation protection in the dental office.

The colorful booklet is illustrated with many line drawings. It contains two main sections, one on "Radiation and its Hazards" and the other on "Practical Procedures." The publication was prepared by Richard H. Chamberlain, M.D., and others of the American College of Radiology, with the assistance of Robert J. Nelsen, Association representative to the National Committee on Radiation Protection.

The manual may be obtained for 25 cents a copy from the Association's Order Department, 222 E. Superior St., Chicago 11.

CIVIL DEFENSE CONFERENCE SCHEDULED FOR NOVEMBER 8

The Council on Federal Dental Services plans to sponsor a civil defense conference in Dallas on November 8, the Saturday preceding the opening of the 1958 annual session of the Association.

E. Jeff Justis, chairman of the Council, said that the conference was being planned because of the increased interest

and the many inquiries received from constituent and component dental societies concerning the programming of civil defense training activities for dentists.

Preliminary plans are for a panel presentation by prominent national civil defense leaders, with open discussion following.

BOARD APPROVES 1959 DATES FOR DENTAL HEALTH WEEK

The Board of Trustees approved by a mail vote the dates of February 8-14 for the 1959 observance of National Children's Dental Health Week. "Unlock Your Smile" has been selected as the slogan for the week.

The celebration of the American Dental Association's centennial year in 1959 will give added significance to the activities of National Children's Dental Health Week, which annually focuses the attention of the public on the importance of dental health.

BRUSH MAKERS GRANT $5,000 FOR DENTAL HEALTH WEEK

A grant of $5,000 has again been made to the American Dental Association by the Toothbrush Division of the American Brush Manufacturers Association for use in the promotion of the 1959 observance of National Children's Dental Health Week.

The grant is the second which has been made by the group. The $5,000 grant which was received by the American Dental Association last year was used to provide 1,000 window displays for use during National Children's Dental Health Week.

Toothbrush manufacturers participating in the grant are E. I. du Pont de Nemours & Co.; Fuller Brush Co.; Lactona, Inc.; Mohawk Brush Co.; Owens Brush Co.; Pro-phy-lac-tic Brush Co.; and Tek-Hughes.

NEW EDITION ISSUED ON DENTAL SCHOOL REQUIREMENTS

The Council on Dental Education has issued a new edition of the booklet, *Requirements for the Approval of a Dental School.*

A new requirement is stated in the booklet that dental students be acquainted with the ways dental auxiliary personnel can be utilized effectively in the dental practice. This requirement was approved by the House of Delegates of the Association.

The new edition supersedes the edition copyrighted in 1955, according to Dr. Shailer Peterson, secretary of the Council on Dental Education.

PLAN REGARDING DESIGNATION OF "REMOTE" BASES SUGGESTED

The Council on Federal Dental Services passed a resolution in late April asking that the Dental Advisory Committee to the Department of Defense be empowered to consider and make recommendations on requests for the designation of military installations in the continental United States as "remote" areas for dependent dental care purposes.

Under the provisions of the Council's resolution, which was sent to Frank B. Berry, M.D., Assistant Secretary of Defense (Health and Medical), the Dental Advisory Committee would consider requests for "remote area" designation when a controversy exists between military authorities and a state dental society concerning such designation.

Currently, a military commander seeking remote area status for a base is required to request from the state dental society a statement indicating the adequacy of dental services in an area to dependents and the society's position concerning the requested designation. A few bases have been declared remote despite a recommendation of the state dental society to the contrary, said Her-

bert C. Lassiter, secretary of the Council. The Council's recommendation would permit the Dental Advisory Committee to mediate in such instances.

The resolution was passed at the meeting of the Council April 25 and 26 in the Association's Central Office.

SPRING NATIONAL BOARD EXAMS TEST RECORD NUMBER

The National Board dental examinations given March 31 and April 1 tested 4,775 examinees, the largest number in the history of the examinations.

Part 1, which is on basic science, was taken by 2,273, and Part 2 on the theory of the science of dentistry was taken by 2,502 examinees, according to Gerard J. Casey, secretary of the Council of the National Board of Dental Examiners.

KINGSBURY TO REPRESENT ASSOCIATION AT A.M.A. MEETING

Bernerd C. Kingsbury of San Francisco, past-president of the American Dental Association, will represent the Association at the annual meeting of the American Medical Association, which is to be held June 23-27 in San Francisco.

Dr. Kingsbury will give greetings to the American Medical Association's House of Delegates at the opening session on June 23 at the Sheraton-Palace hotel.

BISHOP ATTENDS RED CROSS CONVENTION

Lyall O. Bishop of Walnut Creek, Calif., president of the California State Dental Association, attended the 1958 annual convention of the American Red Cross in San Francisco May 19-21 as the representative of the American Dental Association.

Alfred M. Gruenther, president of the American Red Cross, issued the invitation for a representative of the Association to attend the convention.

ACCEPTED DENTAL REMEDIES GOES INTO SECOND PRINTING

The first printing of the 1958 edition of *Accepted Dental Remedies* has been exhausted, and a second printing has been ordered to meet the continued demand for the publication. Copies will again be available the first of June.

The handbook is prepared annually by the Council on Dental Therapeutics. The 1958 edition was extensively revised over previous editions.

The publication is available for $3 a copy from the Order Department at the Association's Central Office.

Legislation

RULING PENDS IN IDAHO CASE ON CHANGE IN PRACTICE ACT

A ruling was not expected until sometime this fall in a case brought by operators of public dental laboratories to test the constitutionality of the recent amendment to the Dental Practice Act in Idaho, according to Bernard J. Beazley, secretary of the Council on Dental Trade and Laboratory Relations.

A 1953 amendment to strengthen the Idaho Dental Practice Act was declared unconstitutional in 1955.

The present case to test the validity of a more recent amendment to the act was filed in 1957. The presentation of the evidence in the case, which was tried before the Ada County, Idaho, District Court, was concluded in April.

ACTION TAKEN IN CANADA ON PUBLIC LABORATORY PROPOSALS

Action has been taken on proposals brought before the legislatures of two Canadian provinces, British Columbia and Alberta, to allow dental laboratory technicians to deal directly with the public.

A bill was introduced in late February in the legislative assembly of British Columbia which would permit dental laboratory technicians to deal directly with the public. The bill finally adopted by the British Columbia assembly requires the registration and licensure of dental laboratory technicians but limits their legitimate transactions to members of the dental profession only.

In Alberta, a proposal to permit direct relations between dental laboratory technicians and the public was referred for further study to a commission which is to be set up during the summer. It is expected that the provincial department of health, the Faculty of Dentistry of the University of Alberta, the Alberta Dental Association, and the laboratories which serve the dental profession and those which deal directly with the public probably will be represented on the commission.

The commission is to study the relations between the dental profession and dental laboratory technicians in general and means for the training and regulation of technicians.

Public Health

P.H.S. ISSUES DIGEST OF PREPAID DENTAL CARE PLANS

Digest of Prepaid Dental Care Plans, 1958, a 46 page publication prepared by the Division of Dental Resources of the Public Health Service, gives information on nearly 100 active prepaid dental care plans.

The digest, which covers all known plans in the United States, is designed to assist professional and lay groups in organizing prepayment programs.

The information includes the name of the plan, address, sponsorship, date established, areas served, eligibility requirements, size of enrollment, methods of operation and benefits provided. The complete fee schedules for four plans are also given.

Single copies are available from the Division of Dental Resources, Public Health Service, U. S. Department of Health, Education and Welfare, Washington 25, D. C.

EASTMAN DENTAL DISPENSARY MARKS 40TH ANNIVERSARY

The 40th anniversary of the founding of the Eastman Dental Dispensary was marked by a special program at the Dispensary in Rochester, N. Y., on April 19.

In conjunction with the anniversary observance, Basil G. Bibby, director of the Dispensary, announced the establishment of a department of periodontology and the appointment of Helmut A. Zander as head of the department.

Also, Elmer J. Pammenter was presented the first Eastman Dental Alumni Award for "outstanding contributions to children's dentistry." Dr. Pammenter became associated with the Dispensary soon after its founding, and he served as head of the Dispensary's infirmary from 1918 to 1950.

The award, which consists of a citation and an engraved plaque, is to be presented every five years to a dentist who has contributed greatly to children's dentistry through research, service or education.

CLUNE, RHODE ISLAND PUBLIC HEALTH DENTIST, DIES

Thomas W. Clune of Cranston, R. I., public health dentist for the state of Rhode Island, died in Providence May 2 at age 52.

Dr. Clune had served on the National Advisory Dental Research Council since

1956, and he represented Rhode Island on the Advisory Board for Higher Education.

A staunch advocate of fluoridation, Dr. Clune graduated from Tufts University School of Dental Medicine and received his master's degree in public health from Massachusetts Institute of Technology.

He had served as president of the Rhode Island State Dental Society, and, at the time of his death, he was chairman of the society's Council on Dental Economics and chairman of a committee which was investigating the possible establishment of a school of dental hygiene in Rhode Island.

Research

AWARDS GIVEN FOR INVENTION OF FLUORSPAR DISSOLVER

Two Public Health Service scientists won Department of Health, Education and Welfare Superior Service Awards for their development of a fluorspar dissolver, an engineering device which cuts the cost of fluoridation of community water supplies by two thirds. The inventors of the device are Franz J. Maier, sanitary engineer director, and Ervin Bellack, a chemist in the laboratory of the Division of Dental Public Health in Bethesda, Md.

Fluorspar, the cheapest of all commercial fluorides, previously was not practical for fluoridation since it does not dissolve readily. The Public Health Service team found that the fluoride in fluorspar becomes available in the presence of alum and subsequently developed a dissolver.

ARMY TESTS JET INJECTOR FOR ANESTHETIC AGENTS

Preliminary tests of a jet injector for anesthesia during dental procedures were reported in an article in the May issue of the *U. S. Armed Forces Medical Journal*. Injection with the device was reported to be painless by the 66 patients on whom the study was made. However, bleeding did occur in some instances.

The study on the spring-driven injector, which shoots liquid into the tissues at a high speed, was made by Lt. Col. Peter M. Margetis, Dental Corps, chief of the dental research branch of the Research and Development Division in the

Eric Martz, 17, of Bloomington, Ind., was one of the 40 winners of the annual Westinghouse Science Talent Search. His project was on a dentifrice and lactobacillus counts. The winners were chosen from 25,000 entrants throughout the country and received a free trip to Washington, D. C., in March to display their projects and to compete for scholarships and awards. Eric received a $250 award.

Army Surgeon General's Office; Lt. Col. Edward P. Quarantillo, Dental Corps, post dental surgeon at Fort Lesley J. McNair; and Lt. Col. Robert Lindberg, Army Medical Service Corps.

NARROD, RESEARCH ASSOCIATE AT N.I.D.R., REPORTS ON STUDY

S. A. Narrod, Ph.D., research associate, American Dental Association, at the National Institute of Dental Research, and W. B. Jakoby, Ph.D., formerly with the dental institute and now with the National Institute of Arthritis and Metabolic Diseases, reported on enzymatic conversion of ethanolamine to glycolaldehyde at a meeting of the Federated Societies held in Philadelphia in April.

The enzymatic conversion was found to be present in a pseudomonad-type organism isolated from nature. The phosphate ester of this compound, o-phosphoryl-ethanolamine, has been found in saliva, cancer tissue and urine.

International

DENTAL MEETING TO BE HELD IN PARIS NOVEMBER 24-30

The 32nd International Dental Meeting of Paris will be held November 24-30 at the Chemistry Building, 28 Rue St. Dominique, Paris 8, France.

Essays will be simultaneously translated into several languages. Limited attendance table clinics, documentary films and commercial exhibits will also be features of the program.

Inquiries concerning the meeting should be addressed to the general secretary, Pierre A. Robert, 10 Rue de l'Isly, Paris 8, France. Mr. Robert has requested registered participants who wish to read reports or papers or present demonstrations or films to write him as soon as possible.

The president of the organizing committee for the meeting is Marcel Rachet.

PROSTHETIC DENTAL WEEK TO BE HELD IN BRAZIL

The first International Prosthetic Dental Week sponsored by the Associacão Paulista de Cirurgiões Dentistas will be held September 14-15 in São Paulo, Brazil.

Dr. Reynaldo Todescan has invited members of the American Dental Association to attend the meeting and to present papers, table clinics or practical demonstrations. A synopsis or description of the work to be presented should be sent to the Central Commission on Organization by July 15. The address is Semana Internacional de Prótese Dental, 126 Avenida São João, São Paulo, Brazil.

SPANISH INDEX IS DEVOTED TO ORTHODONTIC ARTICLES

A new index to orthodontic literature has been published in Spain with the intention of facilitating the consultation of world literature by orthodontists.

According to the compiler Dr. Alberto J. Cervera, a member of the Sociedad Española de Ortodoncia, the index will be published annually at a subscription rate of $2 a year.

The volumes covering the years 1954 and 1955 have been received by the Bureau of Library and Indexing Service. The issues carry 1957 as the imprint date. Articles from Spanish, French, German, Swedish, Italian, English and other languages are among those included.

The 1954 issue indexes 127 dental journals and contains 799 entries. The titles are usually given in the language of the original article. The 1955 issue contains 440 entries from 85 dental journals. The compiler states that the index has been limited to original writings in orthodontics only.

Dr. Cervera's address is 29 Avenida del Oeste, Valencia, Spain.

Charles E. Bohlen, U. S. ambassador to the Philippines, was given the first certificate opening the Second Asian Dental Congress and Asian-Pacific Dental Conference when he was visited at the embassy in Manila by representatives to the meeting. The certificate was given by the American Dental Association and was approved by the Philippine Dental Association. Seated (l. to r.) are: W. R. Alstadt, president, American Dental Association, who represented the Association and the F.D.I. at the meeting; Mrs. Alstadt; Col. Agustin Zarate, president, Philippine Dental Association; Ambassador Bohlen; B. B. Eraña, president, Asian-Pacific Dental Federation; Capt. Anthony Kaires, chief, U. S. naval dental service in the Philippines; Ralph Boos of Minneapolis, clinician at the meeting; and Mrs. Boos. Over 1,200 dentists from 20 nations were present at the meeting, which was held March 24-30 at the University of the East in Manila.

DENTAL CONGRESS IN MEXICO IS SET FOR NOVEMBER 18-23

The Pan American Dental Congress, which is sponsored by the Mexican Dental Association, will be held in Mexico City November 18-23, immediately following the annual session of the American Dental Association in Dallas, Texas.

Information concerning the Congress may be obtained from Roberto E. Woodward, foreign secretary of the Mexican Dental Association, Sinaloa no. 9, Mexico 7, D.F., Mexico.

DENTISTS IN PARAGUAY ANNOUNCE OFFICERS

Víctor A. Boettner was elected president of the Círculo de Odontólogos del Paraguay at the group's general assembly March 30.

Other officers and members of the board of directors were César F. B. Franco, vice-president; Miguel Angel Barreiro M., secretary; Juan María Ríos G., assistant secretary; Carim Bittar, treasurer; and Norman Zavala, assistant treasurer.

José María Galiano, Leopoldo Elizeche B., Víctor M. Vera, Carlos González Durand and Vicente Espínola were elected to the tribunal of honor.

CONGRESS OF STOMATOLOGISTS TO BE HELD IN YUGOSLAVIA

The Second Congress of Stomatologists of Yugoslavia will be held in Belgrade September 18-20.

Further information may be obtained from the secretary of the Congress, Dr. Pavle Stošić, Faculty of Dentistry, Ulica Rankeova 4, Belgrade, Yugoslavia.

SPANISH, PORTUGUESE INDEX TO LITERATURE IS ISSUED

The third volume of the Indice de la Literatura Periódica en Castellano y Portugués, which covers the literature for 1954, is now available.

Articles from 82 publications from 17 countries are included in the 3,517 subject and author entries.

The index follows the style of the *Index to Dental Literature* published by the American Dental Association. It is published under the auspices of the Asociación Odontológica Argentina, under the supervision of their indexing committee. Work on 1955 and 1956 is in progress.

Volumes for 1952, 1953 and 1954 are $7 each. English-Spanish and Spanish-English subject heading lists are $3 each. The publications may be obtained from the Asociación Odontológica Argentina, Biblioteca, Junin 959, Buenos Aires, Argentina, or from the Order Department of the American Dental Association.

Dental Societies

MID-CONTINENT CONGRESS IS SCHEDULED FOR OCTOBER

A special course on clasp-retained partial dentures will be one of the features of the Mid-Continent Dental Congress, which is to be held at the Chase-Park Plaza hotel in St. Louis October 12-15.

Essayists during the Congress will include Lee Roy Main of St. Louis; George

Several visitors attending the 55th annual meeting of the Montana State Dental Association, held May 1-3 in Butte, were guests of the Anaconda Company for an underground tour of a copper mine. In the picture (l. to r.) are: Mr. John Keating, assistant foreman of the mine; Mr. Herbert B. Bain, director, Bureau of Public Information, American Dental Association; William R. Alstadt, president, American Dental Association; Paul W. Zillmann, consultant to the A.D.A. Council on Insurance and trustee of the Association's accident and health insurance program; and Fritz A. Pierson, trustee, Eleventh District, American Dental Association.

H. Moulton of Atlanta, Ga.; Roland D. Fisher of Glendale, Calif.; Eugene W. Skinner, Ph.D., of Chicago; William F. Via, Jr., of Detroit; F. D. Ostrander of Ann Arbor, Mich.; W. Harry Archer of Pittsburgh; and Hollis A. Askey of Lincoln, Neb.

Table and projected clinics are to be given on the evening of October 13.

In addition, commercial, scientific and hobby exhibits and social events, including a program of women's entertainment, will be features of the Congress.

All members of the American Dental Association are invited to attend the Congress.

Further information may be obtained from the St. Louis Dental Society, 8013 Maryland Ave., Clayton 5, Mo.

AUXILIARY TO SOCIETY GIVES X-RAY MACHINE TO HOSPITAL

The Woman's Auxiliary to the Philadelphia County Dental Society has presented an x-ray machine to the Children's Hospital of Philadelphia. The x-ray machine has been installed in the hospital's dental clinic.

Mrs. J. Howard Curry, vice-president of the auxiliary, and Mrs. Fred J. Lucchesi, project chairman, made the presentation to Raymond Werther, head of the division of dentistry of the hospital.

Dental Education

H. R. MACLEAN APPOINTED DEAN OF CANADIAN DENTAL SCHOOL

H. R. MacLean has been appointed dean-elect of the Faculty of Dentistry, University of Alberta, Edmonton, Alberta, Canada. He will succeed W. Scott Hamilton as dean September 1.

Dr. MacLean has served on the dental faculty of the university since 1936 and as professor of operative dentistry since 1942. He is president of the National Dental Examining Board of Canada and past-president of the Edmonton and District Dental Society and the Alberta Dental Association.

CALIFORNIA SCHOOL ADDS TO CLINIC FACILITIES

Construction is now underway on a $230,000 addition to the present dental clinic at the University of Southern California School of Dentistry in Los Angeles, according to Robert W. McNulty, dean.

The addition to the clinic was made possible through donations from members of the Century Club, a group of dentists, many of them alumni of the school.

The construction is the second step in the master plan for the expansion of the School of Dentistry. The addition of a second story on the clinic building is also planned later.

DENTAL SCHOOLS ANNOUNCE PROGRAMS FOR SUMMER, FALL

Iowa • The College of Dentistry of the State University of Iowa will hold a conference on "Newer Drugs and Their Dental Application" June 14. Faculty members of the college will present lectures on various types of drugs, with question periods following the lectures. A. M. Bjorndal will serve as moderator.

A postgraduate course for general practitioners in dentistry for children will be given September 15-19. Emphasis will be placed on psychological management of the child as well as on pedodontic procedures. Clinical practice in the children's clinic of the college will also be part of the course. Kenneth E. Wessels will direct the course, with other faculty members assisting. The fee for the course will be $50.

Inquiries should be addressed to the college in Iowa City.

North Carolina • The School of Dentistry and the extension division of the University of North Carolina will give a postgraduate course in crown and bridge prosthodontics June 12-14 in Chapel Hill, N. C.

The course will consist of lectures and demonstrations presented on closed circuit television. No clinical or laboratory work will be required of participants.

Tuition is $75, and payment of a $25 advance registration fee is requested.

Applications may be made through the office of postgraduate instruction, School of Dentistry, University of North Carolina, Box 750, Chapel Hill, N. C.

Minnesota • The University of Minnesota School of Dentistry and Center for Continuation Study has announced its 13th annual seminar on the study and practice of oral medicine. Sessions will be held at the continuation study center in Minneapolis September 26 and 27.

Further details and information may be obtained from the Center for Continuation Study, University of Minnesota, Minneapolis 14.

Mississippi • A conference on periodontics and dental medicine will be held August 13-14 at the Center for Continuation Study at the University of Mississippi.

Clinicians will include Donald A. Kerr of Ann Arbor, Mich., and Frank Wentz of Chicago. John W. Stone, director of dental health for the Texas Department of Health, will speak at a banquet meeting August 13 on the "Distribution, Incidence and Health Burden of Periodontal Disease."

Housing is available for conferees.

Further information is available from Mr. D. C. Trexler, director, department of conferences, institutes and short courses, University of Mississippi, University, Miss.

Tufts • A special participation course in periodontology will be given by Tufts University School of Dental Medicine, Boston, October 6-10.

Irving Glickman will be in charge of the course, which will consist of clinical sessions supplemented by lectures and demonstrations.

Tuition for the course is $150. Further information may be obtained from the director of graduate and postgraduate studies at the school, 136 Harrison Ave., Boston.

Washington • "Orthodontic Diagnosis and Treatment of the Mixed Dentition" will be the subject of a refresher course given by the University of Washington School of Dentistry June 30 through July 2.

Instructors will include Burl F. Dewel of Chicago; S. J. Kloehn of Appleton, Wis.; and Charles H. Tweed, Jr., of Tucson, Ariz.

Tuition for the course will be $60, and at least $30 must accompany the application form. The closing date for applications is June 10.

Further information may be obtained from the department of postgraduate dental education of the dental school in Seattle.

General

DENTISTS URGED TO ASSIST IN YOUTH FITNESS PROGRAMS

The week beginning June 1 has been proclaimed National Youth Fitness Week by President Eisenhower.

C. Willard Camalier, assistant secretary of the American Dental Association and a member of the President's Citizens Advisory Committee on the Fitness of American Youth, has urged all constituent and component societies to cooperate with local youth fitness programs. He has suggested that dentists serve on state or local fitness committees and aid in establishing and implementing dental programs in public and private schools and in correctional and mental institutions.

Since he will be called on to report to the President's Citizens Advisory Committee, Dr. Camalier would like information from the secretaries of societies on the participation of the dental profession in youth fitness programs.

The proclamation, which is shown on the opposite page, was signed by President Eisenhower on April 30.

THE WHITE HOUSE

NATIONAL YOUTH FITNESS WEEK

BY THE PRESIDENT OF THE UNITED STATES OF AMERICA

A PROCLAMATION

WHEREAS the youth of our Nation constitutes one of our most valuable assets; and

WHEREAS the scientific and technological advances of recent years have eased the problems and hardships of everyday living and have lessened the need for physical activity on the part of our young people, with a consequent adverse effect on the health of our Nation; and

WHEREAS the Chairman of the President's Council on Youth Fitness, established in July 1956 to stimulate existing programs and to initiate other measures tending to enhance the fitness of American youth, has recommended that the week beginning June 1, 1958, be designated as National Youth Fitness Week; and

WHEREAS the fitness of our young people can be promoted through the determined and constant effort of all our citizens, both young and old:

NOW, THEREFORE, I, DWIGHT D. EISENHOWER, President of the United States of America, do hereby proclaim the week beginning June 1, 1958, as National Youth Fitness Week.

I request officials of the Government, and I urge American parents . . . and civic groups, to use all appropriate means during that week to promote programs and activities which will better the mental, social, spiritual, and physical fitness of the youth of America to the end that we may assure the continuing strength and well-being of our Nation.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Seal of the United States of America to be affixed.

DONE at the City of Washington this thirtieth day of April in the year of our Lord nineteen hundred and fifty-eight, and of the Independence of the United States of America the one hundred and eighty-second.

(SEAL)

DWIGHT D. EISENHOWER

By the President:
JOHN FOSTER DULLES
Secretary of State

Rear Admiral Alfred W. Chandler, U. S. Navy (retired), received a scroll in recognition of his leadership in naval dentistry from the National Lafayette Baton Committee on April 24. Among those present at the ceremony were (l. to r.): Admiral Chandler; C. Willard Camalier, assistant secretary of the American Dental Association; Manly Michaels; Rear Admiral Ralph W. Malone; and Capt. Curtiss W. Schantz

LAFAYETTE BATON COMMITTEE HONORS ADMIRAL CHANDLER

Rear Admiral Alfred W. Chandler, Dental Corps, U. S. Navy (retired), was honored for his leadership in naval dentistry April 24 at the National Naval Medical Center, Bethesda, Md. He was awarded a scroll by the National Lafayette Baton Committee, thus becoming the first naval officer and the first dentist to be honored by the Committee.

Admiral Chandler, formerly chief of the dental division and assistant to the chief of the Bureau of Medicine and Surgery for Dentistry, Navy Department, was greatly interested in dental education, and he worked to improve the training program for dental personnel.

His name has been placed on the National Lafayette Honor List, which recognizes selected persons for the leadership in various fields. The list honors the memory of the Marquis de Lafayette.

LEGACIES SOUGHT TO BROADEN PROGRAM OF GIES FOUNDATION

The William J. Gies Foundation for the Advancement of Dentistry hopes to acquire additional capital from legacies for broadening its program.

The Foundation's Board of Directors at a meeting in April expressed gratification over the large number of dentists who make annual contributions. It was noted, however, that grants made during this year have already reached budgetary limits and that it would be a long time before the investment of gifts would provide enough income to finance an expanded program.

The Board expressed the hope that dentists would include the Foundation among the legatees in their wills and also requested dentists to utilize any appropriate opportunity to approach patients interested in the advancement of dentistry about legacies.

Additional information may be obtained from the William J. Gies Foundation for the Advancement of Dentistry, Inc., 221 Fourth Ave., New York 3.

TESTIMONIAL DINNER HONORS THOMAS P. FOX

Thomas P. Fox of Philadelphia, a member of the Civilian Health and Medical Advisory Council, Office of the Assistant Secretary of Defense (Health and Medical), and chairman of the Dental Advisory Committee to the Department of Defense, was honored at a testimonial dinner, given April 16 in Philadelphia.

Gerald D. Timmons, speaker of the House of Delegates of the American Dental Association, was toastmaster at the dinner, and Charles H. Patton, Association trustee from the Third District, was one of the speakers.

Dr. Fox, who is a brigadier general in the Dental Corps, U. S. Army Reserve, is a consultant to the Council on Federal Dental Services and for many years has served as a member of the House of Delegates of the Association.

SEMINAR ON PEDODONTICS SET FOR SEPTEMBER

The Third Annual Pedodontic Seminar sponsored by the Northern California Unit of the American Society of Dentistry for Children will be held September 12-13 at the Ahwahnee hotel, Yosemite Valley, California.

Space maintenance, tooth guidance and interceptive orthodontics will be the subjects discussed.

The deadline for reservations is July 1. Further information may be obtained from Charles A. Sweet, Jr., 2940 Summit St., Oakland 9, Calif.

GREENWOOD HEADS INDUSTRIAL DENTISTS GROUP

Alan W. Greenwood of Gardena, Calif., took office as president of the American Association of Industrial Dentists April 23.

The three-day meeting of the association was held in conjunction with the 13th National Industrial Health Conference, which took place April 19-25 in Atlantic City, N. J.

Other officers elected included Kenneth W. Misher of Chicago, president-elect; Guy C. Kirby of East Hartford, Conn., vice-president; and Edward R. Aston of Camp Hill, Pa., secretary-treasurer.

Elected directors were Edward B. Elvers of New York, who will serve as chairman; Donald W. Henry of Montreal, Canada; Aaron Finkelman of Philadelphia; Leonard S. Morvay of Newark, N. J.; Calvin H. Weiss of Webster Grove, Mo.; and Robert B. Nemiroff of Port Washington, N. Y.

The other professional organizations that participate annually in the Industrial Health Conference are the Industrial Medicine Association, the American Industrial Hygiene Association, the American Association of Industrial Nurses and the American Conference of Governmental Industrial Hygienists.

BUMSTEAD, OFFICER OF DENTAL EXAMINERS ASSOCIATION, DIES

Carl A. Bumstead of Lincoln, Neb., who served as secretary-treasurer of the American Association of Dental Examiners for many years, died at the age of 70 on April 24.

Dr. Bumstead was a member of the Nebraska State Board of Dental Examiners from 1941 to 1950. He served as secretary of the Nebraska State Dental Association from 1939 to 1941 and as treasurer from 1941 to 1943. Dr. Bumstead received his dental degree from the University of Michigan. He was a fellow of the American College of Dentists and a life member of the American Dental Association.

He is survived by his wife, two daughters and a son.

TECHNICIANS UNION LOCAL IS FORMED IN OKLAHOMA

Robert Shewmaker of Tulsa is president of the newly formed local 451 of the Brotherhood of Dental Trades. The local received its charter in the Building Service Employees International, which is affiliated with the AFL-CIO.

The local has jurisdiction throughout Oklahoma and claims to have approximately 50 members.

ENDODONTISTS ASSOCIATION HONORS COOLIDGE

At the recent annual meeting of the American Association of Endodontists in Chicago, the association elected Edgar D. Coolidge of Chicago honorary president for the 1959 term in recognition of his research, teaching and his contributions to the advancement of endodontics.

The next annual meeting of the association is to be held February 6-8, 1959, at the Conrad Hilton hotel in Chicago.

NASHVILLE MAN IS INDICTED ON ILLEGAL PRACTICE CHARGE

An indictment was brought against J. E. Hooper, a denture maker in Nashville, Tenn., charging him with the illegal practice of dentistry. The trial was set for early June before the Criminal Court of Davidson County, Tenn.

11TH CONFERENCE ON AGING TO BE HELD JUNE 23-25

"Social Gerontology and its Applications" will be the topic of the 11th annual Conference on Aging June 23-25. The Conference will be held in the Michigan Union building on the University of Michigan campus in Ann Arbor.

Conference sponsors include the University of Michigan, the Federal Council on Aging and the Inter-University Council for Social Gerontology.

Additional information may be obtained from the institutes department, University of Michigan Extension Service, Ann Arbor.

INJUNCTION ISSUED AGAINST IOWA LABORATORY OPERATOR

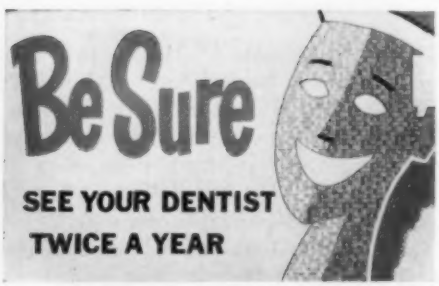
An injunction was issued by Judge Charles Penningroth of the District Court of Linn County, Iowa, in late April restraining Gilbert J. Toren, doing business as a public dental laboratory in Cedar Rapids, from practicing dentistry illegally.

Toren has appealed the decision to the Iowa Supreme Court, according to Caryll S. Foster, president of the Iowa State Dental Society.

ACADEMY OF DENTISTRY FOR HANDICAPPED NAMES OFFICERS

Hugh Kopel of Detroit was elected president of the Academy of Dentistry for the Handicapped at the group's recent annual meeting in Chicago.

Other officers chosen were Max L. Bramer of Chicago, president-elect, and Robert I. Kaplan of Camden, N. J., secretary-treasurer.



This four-color poster is being displayed during June on the more than 3,200 delivery trucks of members of the Linen Supply Association of America. The poster on dental health is part of the association's year-round public service program.

The Reader Comments

THE JOURNAL *devotes this section to comment by readers on topics of current interest to dentistry. The editor reserves the right to edit all communications to fit available space and requires that all letters be signed. At the request of the author, signatures will be deleted before publication. Printed communications do not necessarily reflect the opinion or official policy of the Association. Your participation in this section is invited.*

The Editor

CANDY AS A MAJOR CAUSE OF CARIES

I was happy to read the editorial, "The Caries in the Candy Box," in the April issue of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION. I would like to commend you for focusing attention on candy as a major cause of dental decay and for not weakening your argument by making too broad a condemnation of all sugar-containing foods.

I feel strongly that available evidence indicates that some types of in-between-meal sugar are more harmful than others and that efforts in dental health education would be more effective if we were to concentrate our attention on such confections and not spread our fire over too wide an area. We know only too well that overly enthusiastic attempts to eliminate sugar completely from the diet have not earned the support of pediatricians and nutritionists and that their lack of support or their resistance to such efforts has greatly handicapped dentistry in its educational endeavors and has caused many patients to question the soundness of dentists' teachings on dental decay.

In using the phrase "less injurious confections," you rightly imply that all sweetened foodstuffs or beverages are not equally cariogenic. In my opinion, it is time that this idea found its way into educational pamphlets of the American Dental Association and that these materials and some of the A.D.A. resolutions were brought up to date. For instance, although much research has indicated that sugar taken in liquids is the least cariogenic, a resolution in the 1953 *Transactions* (page 225) singles out sweetened beverages for special condemnation.

I am satisfied that the best way of encouraging the manufacturers of confections of all sorts to pay attention to the caries problem and to do something toward making their products less cariogenic is to lay the blame squarely where scientific information indicates it should be placed and not to treat sugar in all forms as equally criminal. Anything that could be done to promote fuller discussion or more critical evaluation of the subject would, in my mind, be most worthwhile.

Basil G. Bibby, D.D.S., Eastman Dental Dispensary, Rochester, N. Y.

COUNCIL ON LEGISLATION

The effect of the new income tax regulations on dentists

On April 3, the Internal Revenue Service issued a new set of regulations governing expenses which may be deducted from federal income tax by persons engaged in businesses and professions. The new regulations were published in full in the *Federal Register* for April 5, 1958.

The sections of the new regulations governing traveling expenses, expenses for education and professional expenses are of special importance to dentists. Section 1.162-5 confirms specifically the dentist's right to deduct the cost involved in attending educational courses designed to improve his skill and learning within a field or fields of dentistry which he practices. That section of the regulation, however, specifically denies a deduction for the cost of an educational course designed to qualify a dentist to become a specialist.

The Internal Revenue Service has announced that amended returns for the years 1955, 1956 and 1957 may be filed by a person who took educational courses during those years, if those courses meet the tests of Section 1.162-5 and the person did not include the cost of the course or courses as a deduction.

EXCERPTS FROM NEW REGULATIONS GOVERNING BUSINESS EXPENSES

§ 1.162-2 Traveling expenses. (a) Traveling expenses include travel fares, meals and lodging, and expenses incident to travel such as expenses for sample rooms, telephone and telegraph, public stenographers, etc. Only such traveling expenses as are reasonable and necessary in the conduct of the taxpayer's business and directly attributable to it may be deducted. If the trip is undertaken for other than business purposes, the travel fares and expenses incident to travel are personal expenses and the meals and lodging are living expenses. If the trip is solely on business, the reasonable and necessary traveling expenses, including travel fares, meals and lodging, and expenses incident to travel, are business expenses. For the allowance of traveling expenses as deductions in determining adjusted gross income, see section 62 (2) (B) and the regulations thereunder.

(b) (1) If a taxpayer travels to a destination and while at such destination engages in both business and personal activities, traveling expenses to and from such destination are deductible only if the trip is related primarily to the taxpayer's trade or business. If the trip is primarily personal in nature, the traveling expenses to and from the destination are not deductible even though the taxpayer engages in business activities while

Excerpted from Federal Register, volume 23, number 68, April 5, 1958.

at such destination. However, expenses while at the destination which are properly allocable to the taxpayer's trade or business are deductible even though the traveling expenses to and from the destination are not deductible.

(2) Whether a trip is related primarily to the taxpayer's trade or business or is primarily personal in nature depends on the facts and circumstances in each case. The amount of time during the period of the trip which is spent on personal activity compared to the amount of time spent on activities directly relating to the taxpayer's trade or business is an important factor in determining whether the trip is primarily personal. If, for example, a taxpayer spends one week while at a destination on activities which are directly related to his trade or business and subsequently spends an additional five weeks for vacation or other personal activities, the trip will be considered primarily personal in nature in the absence of a clear showing to the contrary.

(c) Where a taxpayer's wife accompanies him on a business trip, expenses attributable to her travel fare are not deductible unless it can be adequately shown that the wife's presence on the trip has a bona fide business purpose. The wife's performance of some incidental service does not cause her expenses to qualify as deductible business expenses. The same rules apply to any other members of the taxpayer's family who accompany him on such a trip.

(d) Expenses paid or incurred by a taxpayer in attending a convention or other meeting may constitute an ordinary and necessary business expense under section 162 depending upon the facts and circumstances of each case. No distinction will be made between self-employed persons and employees. The fact that an employee uses vacation or leave time or that his attendance at the convention is voluntary will not necessarily prohibit the allowance of the deduction. The allowance of deductions for such expenses will depend upon whether there is a sufficient relationship between the taxpayer's trade of [sic] business and his attendance at the convention or other meeting so that he is benefiting or advancing the interests of his trade or business by such attendance. If the convention is for political, social or other purposes unrelated to the taxpayer's trade or business, the expenses are not deductible.

(e) Commuters' fares are not considered as business expenses and are not deductible.

§ 1.162-5 Expenses for education. (a) Expenditures made by a taxpayer for his education are deductible if they are for education (including research activities) undertaken primarily for the purpose of:

(1) Maintaining or improving skills required by the taxpayer in his employment or other trade or business, or

(2) Meeting the express requirements of a taxpayer's employer, or the requirements of applicable law or regulations, imposed as a condition to the retention by the taxpayer of his salary, status or employment.

Whether or not education is of the type referred to in subparagraph (1) of this paragraph shall be determined upon the basis of all the facts of each case. If it is customary for other established members of the taxpayer's trade or business to undertake such education, the taxpayer will ordinarily be considered to have undertaken this education for the purpose described in subparagraph (1) of this paragraph. Expenditures for education of the type described in subparagraph (2) of this paragraph are deductible under subparagraph (2) only to the extent that they are for the minimum education required by the taxpayer's employer, or by applicable law or regulations, as a condition to the retention of the taxpayer's salary, status, or employment. Expenditures for education other than those so required may be deductible

under subparagraph (1) of this paragraph if the education meets the qualifications of subparagraph (1). A taxpayer is considered to have made expenditures for education to meet the express requirements of his employer only if the requirement is imposed primarily for a bona fide business purpose of the taxpayer's employer and not primarily for the taxpayer's benefit. Except as provided in the last sentence of paragraph (b) of this section, in the case of teachers, a written statement from an authorized official or school officer to the effect that the education was required as a condition to the retention of the taxpayer's salary, status, or employment will be accepted for the purpose of meeting the requirements of this paragraph.

(b) Expenditures made by a taxpayer for his education are not deductible if they are for education undertaken primarily for the purpose of obtaining a new position or substantial advancement in position, or primarily for the purpose of fulfilling the general educational aspirations or other personal purposes of the taxpayer. The fact that the education undertaken meets express requirements for the new position or substantial advancement in position will be an important factor indicating that the education is undertaken primarily for the purpose of obtaining such position or advancement, unless such education is required as a condition to the retention by the taxpayer of his present employment. In any event, if education is required of the taxpayer in order to meet the minimum requirements for qualification or establishment in his intended trade or business or specialty therein, the expense of such education is personal in nature and therefore is not deductible.

(c) In general, a taxpayer's expenditures for travel (including travel while on sabbatical leave) as a form of education shall be considered as primarily personal in nature and therefore not deductible.

(d) If a taxpayer travels away from home primarily to obtain education the expenses of which are deductible under this section, his expenditures for travel, meals, and lodging while away from home are deductible. However, if as an incident of such trip the taxpayer engages in some personal activity such as sightseeing, social visiting or entertaining, or other recreation, the portion of the expenses attributable to such personal activity constitutes nondeductible personal or living expenses and is not allowable as a deduction. If the taxpayer's travel tivity constitutes nondeductible personal the taxpayer's expenditures for travel, meals, and lodging (other than meals and lodging during the time spent in participating in deductible educational pursuits) are not deductible. Whether a particular trip is primarily personal or primarily to obtain education the expenses of which are deductible under this section depends upon all the facts and circumstances of each case. An important factor to be taken into consideration in making the determination is the relative amount of time devoted to personal activity as compared with the time devoted to educational pursuits. Expenses in the nature of commuters' fares are not deductible.

(e) The provisions of this section may be illustrated by the following examples:

Example (1). A is employed by an accounting firm. In order to become a certified public accountant he takes courses in accounting. Since the education was undertaken prior to the time A became qualified in his chosen profession as a certified public accountant, A's expenditures for such courses and expenses for any transportation, meals, and lodging while away from home are not deductible.

Example (2). B, a general practitioner of medicine, takes a course of study in order to become a specialist in pediatrics. C, a general practitioner of medicine, takes a 2-week course reviewing develop-

ments in several specialized fields, including pediatrics, for the purpose of carrying on his general practice. B's expenses are not deductible because the course of study qualified him for a specialty within his trade or business. C's expenses for his education and any transportation, meals, and lodging while away from home are deductible because they were undertaken primarily to improve skills required by him in his trade or business.

Example (3). D is required by his employer (or by State law) either to read a list of books or to take certain courses giving six hours academic credit every two years in order to retain his position as a teacher. D fulfills the requirement by taking the courses and thereby receives an automatic increase in salary in his present position and salary schedule. Also, as the result of taking the prescribed courses, at the end of ten years, D receives a master's degree and becomes automatically eligible for an additional salary increase. Since D's purpose in taking the courses was primarily to fulfill the educational requirement of his employer, his expenses for such education and transportation, meals, and lodging while away from home are deductible.

Example (4). The facts are the same as in example (3) except that, due solely to a shortage of qualified teachers, D's employer does not enforce the prescribed educational requirements in that other teachers who do not fulfill those requirements are retained in their positions. D's expenses are nevertheless deductible.

Example (5). E, a high school teacher of physics, in order to improve skills required by him and thus improve his effectiveness as such a teacher, takes summer school courses in nuclear physics and educational methods. E's expenses for such courses are deductible.

Example (6). F takes summer school courses in order to improve skills required by him in his employment as a teacher. As a result of taking such courses F receives an in-grade increase in salary in his present position pursuant to a salary schedule established by the school system for which he works. F's expenditures for such courses are deductible.

Example (7). G, a graduate student at a university, plans to become a university professor. In order to qualify as a regular faculty member, G must obtain a graduate degree. While taking the required graduate courses, G is engaged in teaching at the university. G's expenses therefore are not deductible since he has not completed the education required to become qualified as a regular faculty member at the time at which he takes such courses.

Example (8). H, a self-employed tax consultant, decides to take a 1-week course in taxation, which is offered in City X, 500 miles away from his home. His primary purpose in going to X is to take the course, but he also takes a side trip to City Y (50 miles from X) for one day, takes a sightseeing trip while in X, and entertains some personal friends. H's transportation expenses to City X and return to his home are deductible but his transportation expenses to City Y are not deductible. H's expenses for meals and lodging while away from home will be allocated between his educational pursuits and his personal activities. Those expenses which are entirely personal, such as sightseeing and entertaining friends, are not deductible to any extent.

Example (9). The facts are the same as in example (8) except that H's primary purpose in going to City X is to take a vacation. This purpose is indicated by several factors, one of which is the fact that he spends only one week attending the tax course and devotes five weeks entirely to personal activities. None of H's transportation expenses are deductible and his expenses for meals and lodging while away from home are not deductible to the extent attributable to personal activities. His expenses for meals and lodging allocable to the week at-

tending the tax course are, however, deductible.

§ 1.162-6 Professional expenses. A professional man may claim as deductions the cost of supplies used by him in the practice of his profession, expenses paid or accrued in the operation and repair of an automobile used in making professional calls, dues to professional societies and subscriptions to professional journals, the rent paid or accrued for office rooms, the cost of the fuel, light, water, telephone, etc., used in such offices, and the hire of office assistance. Amounts currently paid or accrued for books, furniture, and professional instruments and equipment, the useful life of which is short, may be deducted.

COUNCIL ON INTERNATIONAL RELATIONS

The Fédération Dentaire Internationale

The exchange of information and experiences with dentists residing and practicing abroad is one of the rewarding interests of a dentist's professional life. Such exchange can be brought about by attendance at dental society meetings abroad, visiting dentists in many lands, and seeing their offices and methods of work. Opportunities for such contacts lie in supporting membership of the Fédération Dentaire Internationale, the international organization of the dental profession. Membership in the F.D.I. is available to all members in good standing of the American Dental Association, with dues for 1958 at $15.

In addition to providing reduced fees at the regular annual meetings of the Fédération and its quinquennial congresses, it also holds attractions of value to the member who does not spend his vacation abroad.

Such benefits of supporting membership include: (1) a beautifully engrossed membership certificate suitable for framing; (2) an annual pocket membership card; (3) an annual subscription to the *International Dental Journal,* a scientific publication issued quarterly; (4) an annual subscription to the *F.D.I. News Letter,* a quarterly publication with news items of dentistry around the world.

The Fédération also provides consultation regarding reservations for travel and hotel on either a group plan or for an individual itinerary. Those interested may contact C. W. Carrick, travel consultant for F.D.I. members in the United States, Oberlin Bank Bldg., Oberlin, Ohio.

The Fédération each year is becoming increasingly valuable to all members of the profession as manifested by the large number of inquiries received daily. Those wishing to hold membership in the Fédération Dentaire Internationale or who wish information pertaining to the Fédération should contact Obed H. Moen, F.D.I. treasurer for the United States, 6 Main St., Watertown, Wis.

For the convenience of dentists who wish to join the Fédération Dentaire Internationale, an application form is printed on page A-52 of this issue of THE JOURNAL.

COUNCIL ON DENTAL EDUCATION

Fourteenth Congress on Dental Education and Licensure

The Fourteenth Congress on Dental Education and Licensure was held February 1, 1958, at the Conrad Hilton Hotel, Chicago. Registered attendance figures show that 135 educators, 75 examiners, 18 dentists and 30 other persons attended these meetings. This total of 258 persons is the largest yet reported in a meeting of the Congress. The topic of the meeting, "Unique Programs in Dental Education," provoked keen interest and alert discussion among the participants and members of the Congress.

Because of the wide general interest in the program theme evidenced during the meetings, THE JOURNAL will offer two articles, with this as the first, to bring you a complete report of this important meeting. Each article will contain three of the six papers given, together with a summary of the discussion by the members of the examining panels and the audience.

A summary of the discussion of each paper has been prepared from a tape recording of the proceedings of the meeting. It is not a verbatim report. Each presents in narrative form the important questions and issues of the discussion and has been reviewed by the speakers and moderators. Comments from the panel members, audience and moderators are presented in summary for brevity and logical arrangement of ideas.

The members of the examining panel whose views of each of the first three papers have been summarized below are: Lester W. Burket, dean, Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania; Raymond J. Nagle, dean, College of Dentistry, New York University; William J. Simon, dean, College of Dentistry, State University of Iowa. Willard C. Fleming, dean, School of Dentistry, University of California, served as discussion moderator.

DENTAL EDUCATION PROGRAM AT THE UNIVERSITY OF TEXAS

J. V. Olson, D.D.S., M.S., Houston, Texas

In order to discuss the program in dental education at The University of Texas, it is necessary to describe the building which houses the dental school. This building differs in many respects from that of most other dental schools. The building consists of four main floors with a partial basement for storage and services and a partial fifth floor for the care and housing of animals for teaching and research. Each of the four main floors of the building was designed for one of the four classes, with additional space provided for offices for teachers, laboratories for teachers, lecture rooms, seminar rooms, conference rooms and library, auditorium and service facilities.

The third and fourth floors provide space for the freshman and sophomore classes respectively with twenty-five unit laboratories on each floor (Fig. 1). Each unit laboratory is designed to provide space, and the necessary built-in equip-

Dean, University of Texas Dental Branch.

Fig. 1 • A freshman unit laboratory

Fig. 3 • Clinical studio, showing combined laboratory and clinical demonstration in complete denture prosthesis

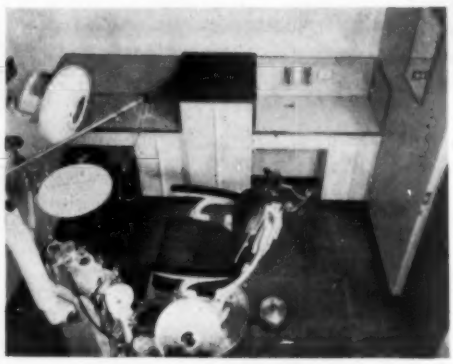


Fig. 2 • View of clinical cubicle, showing desk instrument cabinet, and laboratory bench

Fig. 4 • Views showing reception of televised instruction in a unit laboratory

ment for four students. Within this laboratory these four students do all their laboratory work for that year. All of the built-in equipment necessary for each of the two years is in the laboratory, and much of the movable equipment is also permanently stored there. Additional equipment when needed is provided by technicians in a service facility (central technical service), who maintain a stock of equipment and provide it as requested by the teachers for the use of the students. This facility also provides other services to the teaching departments.

The only difference between the unit laboratories on the third and on the fourth floors is that the third floor laboratories, which are occupied by the freshman class, have a stainless steel dissection table with a closable cover. The laboratories on the fourth floor, which are occupied by the sophomore class, do not have the stainless steel cover on this table.

The first and second floors are designed for the clinical classes with the junior class occupying the second floor and the senior class the first floor. The clinical area of each floor is divided into cubicles which are in effect small dental offices with all of the necessary equipment for the practice of dentistry with the exception of an x-ray machine and for the heavier type of laboratory items (Fig. 2). Each floor has a separate prosthetics laboratory for the heavier type work and five rooms containing x-ray machines with an adjacent dark room facility. There are, of course, the usual dispensing facilities and patient waiting areas on both of these floors.

One further facet of this building which must be mentioned is the closed-circuit television system. This system consists of two studios, one equipped for clinical teaching (Fig. 3) and one for laboratory teaching, with monitors in all of the unit laboratories (Fig. 4) and in the lecture rooms, seminar rooms, conference rooms and the auditorium. The audio portion is carried over the audio system of the building with each monitor having a hand microphone attached to it so that it is possible for the students to ask questions either during the demonstration or at a time determined by the teacher.

The teaching program at the University of Texas is based on the theory that the average dental student should be fairly mature, that he needs to develop his own sense of responsibility for learning and that the teacher should be a guide and adviser. It was for this purpose that the unit laboratory system was adopted. The usual lectures and demonstrations are not eliminated in this system; however, the number of lectures and demonstrations can be reduced, particularly since television can be used effectively in many instances to demonstrate a particular project to the entire class at one time, with each member of the class able to see as though he were the only observer. For instance, in the freshman year the anatomy department, in teaching gross anatomy, makes use of both the lecture room and the television system for teaching in the unit laboratories. They have a lecture at the beginning of the period assigned to gross anatomy at which time they discuss the region to be dissected for that period. This is followed by a demonstration dissection over the television system. After this demonstration, the instructors circulate throughout the unit laboratories and offer assistance where needed. The other courses in the freshman year are taught in this same general manner, the use of the television system and of the lecture room varying to some extent with the individual courses. In the sophomore year, one course in particular, complete denture prosthesis, uses television exclusively after the first lecture period. In this course all of the demonstration-lectures are given over television with a demonstration including the steps the student carries out in the laboratory and the steps as they are carried out on the actual pa-

tient. This can be done quite conveniently by television. The sophomore student's interest in his work is built up as he sees the work done on a living patient.

In general, the teaching program for the freshman and sophomore years makes use of lectures given in lecture rooms, conferences with smaller groups of each class, and demonstrations or lecture-demonstrations to a class by means of television with the class remaining in their own laboratories. Examinations are given at fairly frequent intervals so that the students may see how they are progressing.

Each department provides detailed laboratory manuals so that the student has, in convenient form, the material necessary to understand each assignment. The hallway into which the unit laboratories open has a number of large lighted display cases which are used by the faculty to show step by step detail of many of the laboratory projects. During the assigned periods for the various courses, the teachers of that course will circulate throughout the unit laboratory area in order to help the students as needed.

During the junior and senior years each student is assigned a clinical cubicle for his sole use, and within this cubicle he performs all of his clinical assignments. Both classes obtain patients from a screening clinic which functions primarily to determine the teaching value and general dental needs of the patients. Each student is then required to work out a diagnosis and treatment plan for that patient. This diagnosis and treatment plan is checked by the clinical staff and either approved or corrected as indicated. Although the student is allowed fairly free selection of patients, a record is kept of his patient load with the type of work indicated in order that the student may have a well-balanced clinical schedule. Although we do have minimum requirements for all of our clinical departments, emphasis is placed on completion of all work on a patient rather than completion of a given requirement, and, with the possible exception of the last few months of the senior year, all students are expected to complete all work necessary for each patient that they accept.

During the junior year the students are under the direct supervision of each clinical department—that is, the oral surgery department checks all extractions, the operative department checks all operative work, and so on. During the senior year, however, a general practice teaching system is used. Under this plan, one instructor is assigned to a bay of 12 students and he is responsible for all of the work of these 12 students. This "general practice" teacher consults with the department representatives at the time that the student is completing his treatment plan for a given patient and also during the course of treatment, depending on the needs of the patient, much in the fashion that a general practitioner refers a patient to a specialist. Weekly clinical conferences are held at which time students present unusual or difficult cases with complete history, study casts, roentgenograms and such other material as may be pertinent. These case reports are discussed and treatment plans are formulated where such is indicated.

In order to provide more time for operative procedures, and also to instruct the senior student in the use of laboratories, a clinical laboratory staffed by technicians is provided. This laboratory is set up to do the usual commercial laboratory procedures such as investing, finishing of dentures, and so on. When the senior student reaches the point that he can perform the laboratory procedures satisfactorily, he is allowed to use the clinical laboratory.

In summary, the University of Texas has no large laboratories for students. The usual laboratories such as anatomy, physiology, or dental materials, are elimi-

nated, and in their place four-man unit laboratories are provided for classes of 100. A closed-circuit television system links all of the unit laboratories to two studios, making it possible for the whole class to see a demonstration without leaving their laboratories, and with each member of the class able to see the demonstration as though he were the sole viewer.

By providing rather complete and detailed laboratory manuals, the number of lectures can be reduced, and the student is better able to develop his own initiative. In the junior year the student is taught by the departmental method, but with the student remaining in his own assigned cubicle throughout the year. In the senior year the student is taught by a general practice instructor with consultation with the departments (specialists) as needed. In both clinical years emphasis is placed on the completion of all work for the patient.

DISCUSSION SUMMARY

A major part of the discussion of this paper centered on the pedagogical innovation of a four-man laboratory unit for the four year curriculum. Many questions from the panel members and the audience were directed to this point. All observers commented on the very favorable physical plant in which the Texas program is offered and noted with further approval, the very excellent financial support which this program enjoyed. Extensive use of closed-circuit television provoked both compliments and questions with respect to the teaching program. Principally, the discussion of the Texas program was limited to questions relating to the teaching of the basic sciences and clinical practice by means of a four-man unit and whether or not television instruction replaced or only supplanted more conventional, "live" instruction.

The four-man laboratory unit was viewed by some as inadvisable, since student errors could not be corrected "as they were being made." Further, it was thought that units of four students might present a greater problem in classroom discipline. It was suggested that freshman and sophomore dental students might need more closely supervised instruction and advice than this arrangement would permit. Groups of four students would not permit the development of the teacher-student relationship as effectively as the more conventional instruction methods. Also, a desirable contact with other students on a wide basis would be curtailed and some of the advantages inherent in mixing students of varied social and economic backgrounds would be sacrificed in the education experience. Still further, such a breakdown of students would require a very high student-faculty ratio and thus place the cost of this method beyond the reach of most schools.

Closed-circuit television instruction was viewed as an effective and proved teaching method, but a question was raised as to whether its intended use was to supplement or supplant conventional instruction. The high wall cubicles for the student laboratory teams, made necessary by the use of the television instruction method, were mentioned as disadvantages to teacher supervision. Questioned, too, was the assignment of only one teacher of clinical dentistry to senior students. It was thought difficult, if not impossible, to find a faculty member qualified to teach in all of the facets of clinical dentistry.

A few questions in the discussions following Dr. Olson's paper concerned the use of a detailed laboratory manual used by the students and prepared by the teaching staff to augment instruction technics. Was this manual worthwhile in the face of its cost of production? Can it be kept current? Can it substitute for more direct teacher-student contact?

A favorable time factor for discussion permitted Dr. Olson to reply specifically to the many questions his paper had provoked. He stated that the four-man laboratory unit was working satisfactorily. Staff supervision of the many cubicles was facilitated by a signal light in each which directed the teacher's attention to the students needing particular help.

Experience seemed to indicate that these four-man units developed team work to a high degree, and that group teaching was yielding better teaching results than the more conventional one-man arrangement. As to the minimum contact of students with each other, Dr. Olson acknowledged this arrangement as a problem, but at the same time, commented that students are grouped as a class in lectures and demonstrations, so that the larger exposure within the class group is not completely lost.

Disciplinary problems and staff supervision, in conjunction with the unique teaching methods used at Texas Dental Branch, presented no problems inasmuch as the class was

divided into teaching sections for these purposes. A faculty member was assigned to each of these sections to keep discipline and to augment television instruction. Insofar as teacher-student ratio is concerned, Texas has no more staff than conventional schools do and consequently, staff costs are no higher here than at other schools.

In regard to the "general practice" instructors, it is felt that since they have the cooperation of all the departmental teachers, they are proving satisfactory. Commenting on the high cubicle walls, Dr. Olson noted some disadvantages to the teachers such as the need for greater movement from one to the other and the need to enter each booth to render assistance and instructional help. Set against these factors, however, was the privacy afforded the student's patient in such cubicles and the reduction of the more general distractions incurred in the use of an open floor plan.

To the question of emphasis in the use of closed-circuit television, Dr. Olson pointed out that whether or not television is used by the teacher at Texas is completely optional. Some of the departments use television instruction exclusively, whereas some do not use it at all. In any case, it is regarded as a supplemental instrument and is not being used to replace conventional methods. The laboratory manual referred to in the discussion may be somewhat detailed, but the position taken by the staff in preparing this teaching aid is that it furnishes the student with more than enough detail to go ahead with work projects on his own. The manual is revised and made current on a yearly basis.

CLINICAL TEACHING AT OHIO STATE UNIVERSITY COLLEGE OF DENTISTRY

Wendell D. Postle, D.D.S., and Hamilton B. G. Robinson,† D.D.S., M.S., Columbus, Ohio*

During their last two years, the students at any dental school are subjected to a "training" program using a tutorial system of education. In any tutorial system, one student and one teacher make the ideal combination but we at Ohio State University, in practical recognition of the need for education of large numbers of dentists for the rapidly increasing population, believe that we must find some way to make the tutorial system applicable to mass education. Technics are taught in the laboratory in all phases of clinical dentistry during the first two (preclinical) years. These courses, as taught at Ohio State University, are similar to those taught in most dental schools. However, we are making an attempt to teach more in less time, thereby better preparing the student so that he may begin to gain his clinical experience at an early date.

In 1951, the College of Dentistry at the Ohio State University moved into new quarters designed to be the site where clinical dentistry could be taught from a fresh approach. We recognized that specialization in dentistry has led to dental teaching on a specialized and even splintered basis. Rather than teaching three or four disciplines of the health specialty of dentistry, we could recognize, in our own and other dental college bulletins, at least 16 subjects.

In an effort to stimulate the dental student to recognize the patient as an individual and to teach him how to be a physician and surgeon for the oral regions, the "family dentist teaching plan" was adopted. The emphasis was changed from teaching, in the clinic, how to make impressions, set-up teeth, cut cavities, solder bridges, scale teeth and contour restorations to instilling into

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the student the desire to establish and maintain oral health for people. The technics are taught before the clinical years, whereas the clinical years are those in which the student learns to be a doctor. We firmly believe that the student must first learn to be a general practitioner, and that he will learn this better if he begins as a student of family dentistry.

The student learns to practice general dentistry in his school cubicle. One important aim is to teach the student in such a way that he can move from his school cubicle to his private office without changing his approach to his patients. He learns to conduct a practice at the same time that he learns the essentials of technical dentistry as they relate to men, women, and children.

When the student first enters the clinic he is given a "practice" of from 10 to 15 patients. These have been selected by the clinic coordinator, a dentist and faculty member, so as to give the student experience in a variety of dental procedures while completing the oral rehabilitation of his patients. The patients have been examined and their treatment planned by students, under faculty supervision, in the diagnosis clinic. In this diagnosis clinic, members of the staff, recognized as experts in various fields, have aided in the planning while teaching the students. By this method the student doing the planning in the diagnosis clinic and the student to whom the patient is assigned both benefit directly from the diagnosis and planning procedures.

There are no "requirements" or "points," as such, except in a few departments, (prosthetics and endodontics). The student is encouraged to learn for the sake of learning, because as a professional man it will be his duty to be able to render adequate and proper dental care. This is emphasized during the one week orientation program which precedes entry into the clinic. The faculty members are encouraged to teach rather than to check. Nevertheless, careful records are kept of each student's clinical progress and on any day the cumulative record of each given student is available.

At least once a month the clinical coordinator reviews each student's record and any obviously deficient students are called to the attention of the administrative officers. Such students are interviewed and, where considered of value, a special faculty consultant is assigned. If at any time a student's practice is reduced by completion of treatment or by loss of patients, it is replenished by additional patients.

The general clinical requirement for graduation is demonstration of the ability to render adequate and proper care to patients without supervision; that is, the ability to practice dentistry and to continue learning. At any time that a student gives acceptable evidence of meeting this general requirement, he is placed on "senior privileges." This privilege is the right to continue his clinical practice with minimal supervision. For example, two members of the present senior class were on "privileges" the day they became seniors, and on January 1st, 15 of the seniors were on "privileges."

The only additional faculty member required for this system is the clinic coordinator. The key men are the general clinical instructors. In our school there are six general clinical instructors teaching full time, and 18 teaching half time. No dentists are employed as clinical instructors unless they are willing to devote at least five half days per week to teaching. We have consultants or specialists in the clinic area. Most of their time is devoted to treatment planning in the diagnosis clinic where they work as teams to teach the students what they should do and why. The general clinical instructors, by and large, are dentists who practice half of their time in Columbus. The average time that these general clinical instructors have been out of school is 12.6 years and the average time they have

been teaching is 6.4 years. An important factor in their ability to teach the newer ideas is the in-service training program for faculty.

It is our belief that, in general, in-service training programs should be presented on the school's time, not on the instructor's free time. For this reason most evening programs for faculty education have been dropped. Each teacher is encouraged to take one of our five day refresher courses each quarter. No tuition is charged to faculty members for these courses. In addition, monthly or biweekly in-service training courses of about two hours duration each are presented by various specialists on the faculty. Each time one of these is offered, it is given from 8:30 until 10:30 on two mornings of a given week so selected that all instructors can attend at one session or the other.

During the past five years the clinical achievement of the students has increased under the family dentist teaching plan (see table).

Two of the most important results of this system cannot be shown by charts. These are the satisfaction and enthusiasm that each student gains from the completion of the oral rehabilitation of 18 to 35 patients and the ability to administer a practice which is a natural outcome of this teaching plan.

Large classes reduce the possibilities of personal contact between key teaching personnel and students. To overcome this difficulty, seminar teaching was established. These "seminars" are special assignments in which groups of from 8 to 15 students meet for three hour periods with faculty members. The method of conducting these sessions is left to the faculty members, and they vary in content from informal discussion sessions to clinical demonstrations. Both junior and senior students participate in seminar teaching. The students are enthusiastic about the seminars although at first they looked upon this as time "lost" from the clinic. We believe they are much better as breaks from the clinic routine than "free time" which formerly we gave in greater amounts.

Each student's program is so arranged that he has at least one half day free on Monday, Tuesday, Wednesday, Thursday, or Friday, as well as Saturday afternoon when the clinic is closed. A list of junior and senior seminar assignments for the current academic year will give a general idea of the seminar teaching plan.

SEMINARS FOR JUNIOR STUDENTS

Autumn

1. Preparing denture cases for the laboratory
2. Amalgam technics
3. Prosthetics

Table • Records of students for two years of clinical education under family dentist teaching plan (selected operations)

Operations	Number completed (average and high)				
	Class of 1953	Class of 1954	Class of 1955	Class of 1956	Class of 1957
Gold foil fillings	22 (37)	15 (33)	12 (29)	12 (34)	10 (25)
Inlays	32 (83)	37 (94)	47 (92)	41 (75)	41 (84)
Amalgam fillings	45 (95)	56 (103	67 (153)	77 (145)	87 (169)
Periodontal treatment	31 (56)	27 (60)	28 (80)	30 (66)	32 (63)
Extractions	150 (200)	150 (200)	72 (162)	75 (164)	80 (181)
Children's restorations	33 (65)	32 (74)	49 (73)	37 (94)	47 (148)
Complete dentures	3 (4)	3.1 (4)	3.1 (4)	3.1 (4)	3 (4)
Partial dentures	2 (4)	2.3 (4)	2.2 (4)	2.3 (5)	2.2 (5)
Crown & bridge (units)	12 (21)	12 (30)	16 (60)	19 (77)	23 (60)

4. Hydrocolloid technics
5. Periodontics
6. Operative dentistry
7. Preventive orthodontics
8. Operative dentistry
9. Clinical problems
10. Crown and bridge
11. Crown and bridge treatment planning

Winter

1. Dentist-laboratory relations
2. Inlay and crown technics (5)
3. Prosthetics
4. Caries diagnosis
5. High speed operative procedures (2)
6. Clinical problems
7. Periodontics
8. Crown and bridge
9. Pedodontics
10. Partial denture prosthesis
11. Crown and bridge treatment planning

Spring

1. Clinical problems
2. Crown and bridge
3. Operative dentistry (2)
4. Oral surgery
5. Periodontics
6. Radiography
7. Pedodontics
8. Prosthetics
9. Crown and bridge treatment planning

SEMINARS FOR SENIOR STUDENTS

Autumn

1. Airbrasive technic (2)
2. Practice administration
3. Oral surgery
4. Periodontics
5. Prosthetics
6. Crown and bridge
7. Prosthetic laboratory relations
8. Operative dentistry
9. Clinical problems
10. Crown and bridge
11. Crown and bridge treatment planning

Winter

1. Caries diagnosis and control
2. Caries research
3. Airbrasive technic
4. Practice administration
5. Oral surgery
6. Periodontics
7. Oral diagnosis and oncology
8. Crown and bridge
9. Ultrasonics in dentistry (2)
10. Prosthetics
11. Operative dentistry
12. Clinical problems
13. Crown and bridge treatment planning

Spring

1. Pedodontics
2. Airbrasive technic
3. Clinical problems
4. Practice administration
5. Diagnosis and oncology
6. Oral surgery
7. Periodontics
8. Hydrocolloid and newer impression materials
9. Crown and bridge
10. Prosthetics
11. Operative dentistry
12. Partial denture prosthesis
13. Crown and bridge treatment planning

There are a few areas of clinical dentistry that are not covered in the cubicle teaching: care of emergencies, care in hospitals of patients who have chronic diseases, care of general hospital patients and care of patients in public clinics. To teach care of emergency problems, a four chair "emergency clinic" has been established at the school. Here patients with toothaches and other emergency problems are treated by students on an assigned basis. The students are also assigned with faculty members, to the City Dental Clinic, to learn the public clinic approach, and to the University, Children's and Tuberculosis hospitals, to learn the care of various types of hospitalized patients.

This family dentist teaching plan, utilizing cubicles but probably workable in open clinics, coupled with the seminar teaching, permits development of dental students who accept professional responsibility, who care for patients rather than work for "points" and who have conducted a dental practice while students. It is not designed to teach perfection in every dental operation to every student. We believe that dental education has erred in attempting to teach everything there is to know about every type of dental problem to every dental student in four years. We attempt to de-

velop capable professional men who will continue to learn after graduation.

DISCUSSION SUMMARY

In contrast to the Western Reserve experiment which will be presented in the second part of this report, the program described by Dr. Postle for the Ohio State University, College of Dentistry, was an operative plan and one which some members of the panel had been permitted to inspect personally. First hand acquaintance with this program produced many compliments concerning its objective to prepare students, by using a case-study method, for solo practice of dentistry. The Ohio State program was adjudged successful in training the student to treat patients, as against other kinds of teaching plans which might only produce graduation credits to be converted later into practice know-how. An excellent and well-rounded teaching staff was regarded as the key to the successful Ohio State program.

It was noted that teachers were encouraged to teach rather than inspect student work; that attention was directed to developing a staff of full-time rather than part-time teachers; that though the staff for this program must be broadly trained to do a good job in the case-method system, a system of refresher course instruction apparently helped accomplish this objective. In its most general features, the Ohio State program reflected good planning, good teacher-student balance and excellent in-service teacher training and orientation. It was particularly praised for its use of the case-study teaching method, as opposed to a point-grade method, and for its senior privilege program. The latter feature was cited as a sound teaching method, permitting a student to practice without having a detailed, step by step instruction in patient management. This theory, it was observed, was a simulation of actual dental practice with close faculty supervision.

Dr. Postle was asked to furnish detailed information concerning his clinical record system. In following a case-study method of instruction, it was felt that records of student performance would constitute a burden to the staff. Was record keeping by IBM machines possible? If so, how did this method work? If not, how did the staff keep adequate records of student performance? A further question concerned the desirability of having a patient treatment plan made in a diagnostic clinic by students not administering to the patient. A closing question noted the desirability of comparing the students who were being graduated by the Universities of Ohio State and Texas. Dr. Postle was asked if such a study were being considered or whether it might eventually be undertaken.

In answering the question concerning the clinical record keeping system used at Ohio State, Dr. Postle indicated that IBM services were not used. The innovation required by the case-study teaching method did, however, involve the dental school in the hiring of a clinic manager. The present manager is a college graduate with factory manager experience. A record system of his own devising was established, and a clerical staff of 25 keeps records current on a 24 hour basis for all students. He likened the job of the manager to that of the assistant in the dental office and stressed the importance to students, teachers and dentists of having this auxiliary help. With this operating system, a daily control record is produced for each student and equally important, each of these records is kept on a qualitative as well as quantitative basis. The student is observed from a standpoint of obtaining clinical experience in as many phases of practice as possible. His work is studied to make sure that he gains a variety of experience before completing the dental course, and he is checked as carefully too for the quality of work performed as he handles each individual patient. Dr. Postle admitted that his teaching staff is larger than that required for the standard curriculum and more than this, requires the services of a good clinic manager and staff. In this respect, on a comparative basis, the Ohio State program would be more costly to operate.

Commenting on the possibility of comparing his graduates with those of other schools, such as the University of Texas, Dr. Postle remarked that no comparative studies have been made, nor are any contemplated. He stated that, in his opinion, the students graduating from the school today are better trained for dental practices than were those students graduated from the former program offered at Ohio State. Dr. Olson volunteered an interest and willingness to make a study of the graduates of his and Dr. Postle's school or any other school that would be interested in running such an experiment.

THE TENNESSEE FOUR QUARTER PLAN IN DENTAL EDUCATION AFTER TEN YEARS

James T. Ginn, D.D.S., Memphis, Tenn.

The dental schools of the United States, prior to World War II, were operating at about two thirds of their capacity because of a corresponding lack of qualified applicants. During this period, the number of graduates was less than the number of dentists leaving the profession through retirement and death. The situation improved somewhat during the War because of the "accelerated program" in dental education, and, since the War, because of an abundant supply of well-qualified applicants and the establishment of new dental schools.

Substantial information[1-4] is now available which indicates that there is developing an acute shortage of the dental manpower necessary to meet the demands for dental services. Some of the far-sighted members of the dental profession have come to the realization that if the dentists cannot meet the demands for dental services, "non-dentists" will do it for them. It is the privilege as well as the responsibility of the dental profession to supply the necessary dental manpower to serve the American people. As Congressman Short[5] stated:

> This nation is more health conscious than at any time in its history. The physicians and dentists of this nation are responsible for the great awakening on the part of the public of the need for improved health care. And having brought about this awakening, it is up to the physicians and dentists of this country to satisfy that demand.

As Fleming[6] has pointed out:

> If dental education is going to assume its part in providing the necessary manpower requirements, it is going to have to do some self-analysis and initiate certain fundamental changes. This is going to be very difficult (one thinks of, but hesitates to use the word "impossible"), because these changes will affect all the other segments of the dental profession, and will necessitate the change in the "follow-the-leader" attitudes we seem to have adopted in recent years. It may mean that our greatest need in the future will be to break with the traditional dictums of today's leaders, . . .

At the present time, the growing demand for more dental service and the tremendous surplus of qualified applicants for admission are putting heavy and increasing pressure on the dental schools to increase the number of dental graduates. It is timely, therefore, to examine the Tennessee Four Quarter Plan in dental education and review the results which it has achieved. It is possible to estimate accurately the Plan's major advantages and disadvantages and to determine with some degree of assurance if such a pattern in dental education is an effective means of increasing promptly, at minimal cost to both the student and the institution, the number and quality of dental graduates.

Because of the widespread demand for dental service and the surge of qualified applicants for admission to dental schools, the Board of Trustees of the University of Tennessee authorized the faculty of the College of Dentistry to develop detailed plans for the inauguration of the Tennessee Four Quarter Plan, and in July 1946 the program was placed in operation. It has been in continuous operation for more than ten years.

Dean, College of Dentistry, University of Tennessee.

1. Schoeny, L. J. Dentistry, mobilization and manpower. J.A.D.A. 42:548 May 1951.

2. American Dental Association, Bureau of Economic Research and Statistics. Number of dental graduates needed in the future. J.A.D.A. 52:484 April 1956.

3. Dental manpower needs of the south. Atlanta, Ga., Southern Regional Education Board, 1957.

4. United States Public Health Service, Division of Dental Resources. A study of dental manpower requirements in the west. A study made for the Western Interstate Commission for Higher Education. Washington, D. C., U. S. Public Health Service, Division of Dental Resources, 1956.

5. Short, Dewey. A congressman speaks. J. Am. Col. Den. 23:179 June 1956.

6. Fleming, W. C. Fourth dimension of dental education. J. Am. Col. Den. 24:163 Sept. 1957.

In 1946, the operation of the Four Quarter Plan already had been observed in the College of Medicine for 15 years. It was apparent that the trustees, the faculty, and the students were generally pleased with the results. The experience gained in the College of Medicine facilitated and simplified the change-over from the "accelerated program" that had been carried on during the War period to the Four Quarter Plan in the College of Dentistry.

The Tennessee Four Quarter Plan in dental education is distinguished by two unique characteristics: (1) Freshman (first quarter) students are admitted in four classes of equal size during the calendar year, at quarterly intervals, and (2) each course of the curriculum is given each quarter of the calendar year.[7]

It should be understood clearly in the beginning that the Tennessee Plan is not the "accelerated program" as we remember it from the War. It is not a speed-up of the educational process, but, in reality, it is a program by which an uninterrupted educational process of the same duration and the same content is conducted by eliminating the so-called summer vacations.

Under the Four Quarter Plan of admissions, a standard summer quarter is added to the three quarters that constitute the conventional academic year. Thirty-five students are admitted at quarterly intervals; namely, January, March, July and September, or 140 admissions each calendar year. Since our students graduate in three calendar years, our total student body is never more than 420 students. In order to graduate the same number of dentists on the standard academic year and the usual plan in dental education, it would be necessary to have a total student body of 560 students.

The Tennessee Plan requires the subdivision of the curriculum of instruction into "courses," each of which extends through one quarter only. Such a course may consist of one lecture weekly or of lectures, laboratory periods, demonstrations, or clinical services. If the volume of instruction in a subject is too great to be compressed into a single quarter, or if it should be prolonged in order to secure better correlation with instruction in a related subject, it is organized into a series of two or more courses. Thus, oral pathology is given in a single course, dental anatomy in a sequence of two courses, and operative dentistry, preclinical and clinical, in a continuous series of nine courses.

The courses thus established are grouped to form a curriculum of 12 quarters of 11 weeks each. In arranging the courses, the student's load has been held to about 33 (clock) hours weekly. The courses presenting a given subject are arranged in a logical sequence and in a continuous series. The presentation of general or fundamental subject matter by lectures or similar means is arranged so as to precede immediately or proceed concurrently, as described, the study of selected material in the laboratories or selected cases in the clinics. Most of the changes in the curriculum during the past ten years have been made in an effort to secure the best sequence and best correlation of courses.

Under the Tennessee Plan, all students take the courses in the same sequence; otherwise the efforts to secure the best sequential arrangement and the best correlation of courses are frustrated. This is possible only if the number of students admitted at a given time is limited to the number that can be taught as a group, without sectioning, in laboratories, clinics, and on hospital services. Our facilities were constructed to take care of about 35 students in a section, and, therefore, we admit a class of 35 students every three months.

From the experience gained in the

7. Hyman, O. W., and Nash, T. P., Jr. The Tennessee four quarter plan after 18 years. J.A.Am.M. Coll. 24:286 Sept. 1949.

College of Medicine and as conceived in 1946, it was anticipated that the Tennessee Four Quarter Plan would accomplish the following objectives:

1. Enable more students to be trained with the same physical facilities. The Plan gives the maximum number of young men and women the opportunity and privilege to study the profession of their choice, and thereby helps to alleviate the dental manpower shortage for both the civilian population and the Armed Forces. For example, the College of Dentistry, during the years of 1941-45 inclusive, trained a total of 150 dentists on the "accelerated program" during World War II. During the years of 1951-55 inclusive, 576 dentists received their training under the Tennessee Four Quarter Plan, or an increase of 284 per cent. This improvement in the number of graduates was due to both the Four Quarter Plan and our expanded educational facilities.

If the present dental educational facilities in the United States were used to their maximum efficiency by the adoption of the Tennessee Plan or a similar plan, four classes of the present size might be graduated every three calendar years. During the period between 1961 and 1976, five additional classes would be trained. A total of 3,600 students were admitted to our dental schools in 1957.[8] Allowing about 8 per cent for failures, illness, and other causes for withdrawals, a total of 3,300 graduates might be anticipated annually under the present system. By the graduation of five additional classes, in the period mentioned, 16,500 dentists would be added to those anticipated, or the equivalent of the dentists that might be trained in 22 additional schools the size of Alabama and North Carolina placed in operation in 1957 on the conventional plan.

2. Enable students to interrupt their dental training on a very flexible basis. Thus it was hoped to encourage enrollment of students who were self-dependent or could expect very limited support only —especially students from the smaller communities. Such students could withdraw from school at the end of any quarter for a reasonable period of time to earn new funds. Likewise, students compelled to withdraw because of illness or other causes could return at the beginning of any quarter. Other students, retarded for scholastic reasons, might repeat one quarter and gain a firm foundation for advancement without losing a year's time.

3. Insure a better distribution of graduates to smaller communities as a consequence of enrolling more students accustomed to life in these communities and tied to these areas by sentimental attachments and financial advantages. The results have been gratifying, for many people living in small communities in Tennessee now have dental services available to them because the "hometown boy" has returned to render the service.

4. Enable students with adequate financial support to complete the standard dental curriculum in three calendar years. This feature is very important to our students since they have spent or may be required to spend two years in the Armed Forces, unlike any period in our peacetime history.

5. Improve the quality of instructions by having instructors teach smaller classes, which results in giving more students individual attention when needed.

6. Improve both the sequence and the correlation of instruction by removing the necessity of rotating students without logical sequence through laboratory and clinical exercises.

7. Reduce the cost of dental education, particularly for the student. The Plan saves the student the cost of living for nine months, and he gains the ad-

8. American Dental Association, Council on Dental Education. Dental students' register, 1957-1958. Chicago, American Dental Association, 1958.

vantage of beginning his practice earlier by the same period of time. Translated in terms of savings and earnings, the student may enjoy the financial advantage in the amount of $7,500.

8. Avoid the dislocation of clinical and hospital services resulting from long summer vacations. This point should be emphasized, for this is one of the reasons given by some dental administrators for requiring students to spend 140 to 152 weeks in completing the dental curriculum when the accepted standard dental curriculum is 128 weeks in length.

9. Enable the student to choose between the conventional four academic years and the three calendar years to secure his dental training. If he elects the four academic years, he is not required to attend any portion of the summer clinics. The proof of the popularity of the Tennessee Plan among our students is shown by the fact that 99 plus per cent elects it when financial resources are adequate.

10. Obtain the best possible returns from the resources available to the University by the maximal use of the physical plant, the scientific and technical equipment, and the services of administrative, clerical, technical, and custodial employees—thus conserving as much of the resources as possible for investment in faculty.

Under the Four Quarter Plan of admissions it is possible to make maximum use of our dental educational facilities. We have been able to admit 140 students annually although classrooms and laboratories accommodate only 35 students. Thirty-five sets of laboratory equipment have been adequate instead of four times as many. The equipment is used four times annually instead of being used one quarter and stored three, but its life is not proportionately shortened. The cost of subsidiary personnel is not increased by the summer quarter.

Generally, the first and most serious disadvantage which is cited against the Four Quarter Plan is the apparent quadrupling of teaching load. Actually, although each course of the curriculum is repeated four times annually, only the lecture or didactic fraction of the teaching load is quadrupled. When students are admitted in groups of 50 or 80 or 140 or more, the usual sizes of classes admitted to our dental schools, extra teachers are assigned as laboratory instructors or as instructors in the clinics in such numbers as to provide one teacher to every 10 to 20 students. In 1946, our curriculum consisted of about 4,200 hours. Of these, about 1,100 were lectures and demonstrations. When this volume of instruction was arranged in courses with the same total of hours and the same number of lectures, and each course was given four times annually, the teaching load in terms of instructor-hours was increased 12 per cent only. Of course, if classes were admitted only twice each year, the percentage of increase would be less.

For example, the course in oral pathology is presented in 33 hours of lectures and 99 hours of laboratory. If the course is given to 140 students in one quarter, with one instructor in the laboratory to every 17.5 students, it would require 825 instructor-hours. If the course is given to 35 students each quarter for four quarters, it would require a total of 924 instructor-hours or an increase of 99 instructor-hours or 12 per cent.

When we began to operate under the plan, we increased the number of teachers in the proportion of about one third, thus reducing the average teaching load. During the past ten years, the teaching load has been reduced by the addition of teachers as resources have been made available to the College of Dentistry. Individual teaching load has no causal relationship to the four quarter system. The teaching load of any faculty is only a relationship between total teaching load and the number of teachers. It tends

to fluctuate with the available resources and the availability of teachers.

By way of clarifying our administrative organization, it should be pointed out that the teaching of the basic sciences to the students in the College of Dentistry, as well as to the students in other colleges and schools of the Medical Units Division of The University of Tennessee, is the function of the School of Biological Sciences.

The substantial reduction in the average teaching load of our faculty in the School of Biological Sciences is referable to the increased interest in research and the diversion of energy to this activity. It is anticipated that there will be a substantial reduction in the present teaching load of our faculty in the College of Dentistry as more resources are made available for the employment of additional personnel. As a result more time and energy may be directed in the channel of research. The Tennessee Plan lends itself to a division of time for teaching and research:

> In envisioning the Four Quarter Plan, (in the School of Biological Sciences,) we accepted the desirability of maintaining the traditional three quarter basis of academic employment which allows the teacher a large measure of freedom from academic responsibilities during the summer. From the beginning, our faculty have had no obligation to teach during the summer quarters and have not been allowed to do so more often than alternate summers. Our teachers who elect their biennial opportunities to do summer teaching receive a proportionate fraction of base salary as additional compensation. Other summer teaching staff is composed of visiting teachers; one of the extra dividends of the Tennessee Plan has been the stimulus furnished by these summer visitors from other institutions.
>
> Although teaching loads of our faculty have been reduced rather than increased under the Tennessee Plan, it has not been possible to avoid the imposition of additional administrative responsibilities on heads of departments. This is not peculiar to our situation. Nevertheless, some of the problems associated with selection of new staff members and departmental employees, inviting the summer staff, organization and direction of the teaching program, the steady expansion of graduate and postgraduate instruction are definitely increased under the Four Quarter system.[9]

The faculty of the College of Dentistry, both full-time and part-time teachers, is employed on the basis of the calendar year rather than on the academic year. In the beginning, it was envisioned that teachers would be employed on the traditional basis of an academic year. Some opposition was raised among members of our faculty, and, summer replacements being unavailable, the plan was soon abandoned.

Since licensing examinations in some states are offered only once annually, this may pose a problem for some of our graduates. However, the great majority of our students come from Tennessee and the surrounding states where the licensing examinations are given biannually. Some of our graduates desiring to practice in other states may enter the armed services and take the qualifying examinations during their tour of duty. Other graduates may work in the various state and local health departments until they have the opportunity to take the examinations. Many of our recent graduates may be found in state and local health departments all over the country.

Although the foregoing and probably other more or less important objections might be brought to bear against the Four Quarter Plan in dental education, in our experience over the past ten years, the advantages far outweigh the disadvantages.

In the first place, the original main objective of training more dentists has been realized to a gratifying degree by the maximum use of our educational facilities. Our dental college has been in continuous operation for the past 80 years. It is interesting to note that 47 per cent of our total number of graduates has been trained since 1946. During the past ten years, enrollment of students from almost every town and hamlet in Tennessee increased greatly, and the pro-

portion of graduates entering practice in small communities has considerably increased. The shortage of dentists in the state has been reduced in all areas. Entire credit for this accomplishment does not belong to the Four Quarter Plan, but it has been a vital factor in the improvement.

We believe that the standards of promotion have been improved as a result of the quarter system. As already observed, students who make a poor start in their training can be required to repeat a quarter without too much loss of time or increase in expense. After repetition of the quarter, they can proceed with a better foundation or be refused further training. Since the hardships are less, the faculty tends to maintain stricter standards. Under the annual admission procedure, students are more often promoted who are below the accepted standards of performance because of the hardships that might be created by the repetition of an academic year.

We believe that health conditions among our students are improved by the quarter system. Each student is given a physical examination on admission and annually thereafter. If serious illness is detected, or if the student becomes ill later, he may withdraw. If recovery is prompt, he may resume his studies at the beginning of the next quarter. Under such circumstances, the student more readily withdraws when ill or may be more readily required to withdraw by the faculty at any level of his training.

Our faculty believes that the quality of instruction has improved under the quarter system. The entire curriculum is so arranged as to give the best sequence and the best correlation possible, and the students progress through the courses in the same sequence. The small number of students in each section promotes better relations between students and teachers. Since the teachers get to know the students, they can promote and graduate them with greater confidence.

Although instruction continues through four quarters annually, there remain ten days' vacation at Christmas, three days each in the spring and fall, and four weeks in the summer. Our students enjoy a total of six weeks' annual vacation. This proves to be adequate for most students.

Definite advantages have accrued to our teachers under the Four Quarter Plan. The Plan lends itself readily to releasing teachers from routine teaching duties for definite periods of time for research. It permits greater flexibility for graduate studies and for intramural practice. Teachers, both full-time and part-time, are employed for the calendar year rather than the academic year. Average faculty income has been improved.

The College of Dentistry, College of Medicine, and the School of Biological Sciences are operating on the Four Quarter Plan. The College of Medicine has been operating on it for the past 28 years. The Schools of Pharmacy and Nursing are set up to operate on the Plan, but the number of qualified applicants to these schools does not justify its operation. If and when such numbers are available, these schools will operate on it.

On the whole, our trustees, our faculty and our students are highly pleased with the results of the Plan. We have been able to train a maximum number of dentists with the resources available to us and by the utilization of our educational facilities to their maximum efficiency.

The Four Quarter Plan in dental education is adopted especially to meet the growing emergency now facing the American dental schools. With minimal changes in the physical plants and equipment, greatly increased admissions are possible, and more dentists can be made available to the country promptly. Under the Plan, dentists can be graduated in three calendar years at smaller proportionate administrative and overhead cost. More of the marginal students may be salvaged because of the opportunity to

repeat by quarters rather than by academic years. Better standards might be enforced because of a greater willingness of teachers to retard students who may benefit by repetition. There is a better salvage of students who, because of illness or finances, find it necessary to drop out of school temporarily, but may return without loss of an academic year.

In conclusion, it might be stated that the Four Quarter Plan in dental education is not offered as anything like the final solution to the problem of adequate dental manpower, but it is presented as a practical method of increasing promptly the number of well-trained dentists. If there is a sound basis for the reports on the projected shortage of dental manpower in the United States, it is time for that segment of the profession dealing with dental education to exert more effort toward the consummation of that ideal expressed in the well-worn phrase, "more and better dental service for the American people." It is time for us to utilize our dental educational facilities to their maximum efficiency if we are not going to be "found wanting" in the years ahead.

DISCUSSION SUMMARY

The Four-Quarter plan used by the College of Dentistry, the University of Tennessee, has been in operation ten years and was patterned after a similar medical school program that has operated at this school since 1931. Encouraged by the success of the medical school program, the dental school, in 1946, made a comparatively easy transition from the "accelerated program," used during the period of World War II, to a plan utilizing all four quarters of the year.

The advantages of this program were cited by Dr. Ginn, the panel members and audience participants in the discussion. First, a 12 month training program divided into administrative "quarters," permits the maximum use of the physical plant of the school. Buildings, classrooms, laboratories and clinics are operated the year-around. This produces an efficient and economical cost of operations. Economic considerations are favorable to the student and to the parents of the student, since it shortens by one year the total cost of professional education. Further, there are advantages accruing to the teaching staff and the student in the resulting smaller size of the classes in this program. A corollary advantage was noted too, in that students who for academic reasons must repeat a subject or course, must repeat only a quarter, rather than a full, four-month academic semester. Finally, the four-quarter system was held to be advantageous in combating regional dental manpower shortages. By permitting maximum use of teaching plant facilities and full student enrollment by quarters, more dentists could be trained in this type of program than in the conventional, two-semester academic year. It was generally agreed, however, that a continuing ample supply of applicants for admission to the dental school would be a necessary guarantee of the successful operation of the "quarter" plan.

Although the advantages of the Tennessee plan were impressive, the discussion of Dr. Ginn's paper also served to point up many of its disadvantages. Some of the criticisms noted in the discussion can be listed briefly as follows:

First, an abundant supply of applicants may not always be available to the school. There is a danger, too, that the academic program has to be fragmented for administrative reasons and often to the disadvantage of sound pedagogy. Some commented that a higher percentage of failure for academic cause might be invited since the repeating of units only retards the student for a single quarter. Most inquirers criticized the program for the heavy teaching load which was imposed on the staff, with its threat of monotony and boredom. In addition, it was observed that the faculty is given no time for self-improvement, research and rest. Questioned too, was the full use of facilities for the undergraduate program. It was thought that graduate and postgraduate training programs and research activities would be curtailed.

The most repeated question about the four-quarter program concerned the heavy burden of teaching imposed, with its corollary problem of preserving inspiration, enthusiasm and integrity of purpose among the teachers.

Replying to the numerous comments and questions which his paper had stimulated, Dr. Ginn first observed that the facilities at his school were planned to operate on the basis of the four-quarter system and an entering class of 35 to 38 students each quarter was its designed capacity. Scholastic failures currently are 2.71 per cent of enrollment and the "repeater-student" problem, although it had been as high as 20 per cent, was now less

than 5 per cent. The quarter system has proved of value in the salvaging of what he described as borderline students. He felt that many good dentists were being graduated from Tennessee who might have been dropped at other schools. His school follows no stated policy as to the number of students permitted to repeat units of study, but rather, each instance was treated on its own merits.

Dr. Ginn stated his belief that the continuous program was an incentive to applicants who were interested in getting a D.D.S. in three years and that the savings to the student who studies at Tennessee is substantial with regard to the total cost of a dental education. He pointed out that, at the present time, applicants (250 to 350) outnumber available places (35 to 38) and come from wide geographic regions, but as a state school, preference in admission is given to students from Tennessee and the southern states with which Tennessee has contact. Standards of admission set by the Council on Dental Education constitute the basis of admissions and serve also to justify substandard applicant refusals who, by law, otherwise would have admissions entitlement.

Commenting on the effect of the continuous program on graduate, postgraduate and research training, Dr. Ginn reported space for ten graduate students in orthodontics and 12 graduate students in pedodontics. The school also offers refresher courses as a part of its regular training program, but space to carry on research is not sufficient. Dr. Ginn said that the need for more research space is recognized, and efforts were now being made to provide it for these purposes.

COUNCIL ON DENTAL RESEARCH

Supplement to List of Certified Dental Materials

The American Dental Association Research Division, National Bureau of Standards, has been advised by the manufacturer of the material listed below that this product is to be withdrawn from the market and, therefore, it should be eliminated from the List of Certified Dental Materials.

CERTIFIED DENTAL AMALGAM ALLOYS
(A.D.A. SPECIFICATION NO. 1, FIRST REVISION)

Alloy	*Manufacturer or distributor*
Pearlol	Wildberg Bros. Smelting & Refining Co.

Change in A.D.A. Specification No. 12 for Denture Base Resin

The following is a notice of change in A.D.A. Specification No. 12 for Denture Base Resin. Paragraph 3.4.7 Transverse Deflection should be changed to show that the maximum permissible deflection limit at 3,500 Gm. for Type I resins has been increased from 1.8 mm. to 2.0 mm. The change is effective immediately.

BUREAU OF ECONOMIC RESEARCH AND STATISTICS

A motivational study of dental care

This is the fourth and last installment of a pilot motivational research study conducted for the American Dental Association by Social Research, Inc. The first three installments, which appeared in March, April and May, dealt with the methodology of the study, basic concepts pertaining to the teeth, social class and its relationship to dental beliefs and practices, dental aspects of childhood, the feeling of inevitability people have regarding dental disease, and the compensations of dental disease. This final installment offers some tentative observations on the public's opinion of the dentist himself and the way he performs.

V. SOME ATTITUDES TOWARD DENTISTS

Attitudes toward dentists, much like attitudes toward other aspects of dental care, are varied and complex. In this chapter we review some of the ideas and feelings people have about these professionals that come forth in this study. We preface this discussion by noting that these observations are by no means complete and are arrived at only in terms of the framework of this pilot investigation.

Dentistry Is a High Status Profession • The dentist occupies a high status in the minds of people, and as such he and his profession evoke a feeling of respect from most individuals. This attitude is akin to feelings people have about physicians, though as will be noted, there appear to be some distinctions that people make between these two related professions.

The high status of the dentist derives from several factors, as revealed by respondents. Somewhat more implicit than explicit is the notion that dentists deal with an important part of the body, and as such are looked up to for their greater knowledge and ability. They are thought of as intelligent people, well educated, informed, and well trained. Their occupation is "clean," their offices well cared for, their working hours pleasant, and their incomes high.

> They are gentlemen from the word go, and very immaculate in every phase. I have no complaints [to make] of them . . .
>
> (Woman, 34, LM)

> Dentists in general are good people. They know how to take care of teeth. They're educated, a little above average in intelligence due to college training . . .
>
> (Man, 47, UL)

> The ones I've had anything to do with were efficient and kind. They never hurt me except that one in my early life. . . . Their offices are pleasant although I can't sit and read while I wait. I sit on the edge of my chair and wait.
>
> (Woman, 49, LM)

Though not fully revealed by the present data, there are suggestions that lower middle class people are most favorable in their attitudes. Upper middle class individuals tend to be somewhat critical (though certainly accepting) of dentists, whereas lower class individuals give evidence of respecting them as authority figures and consequently are more intimidated and possibly more resentful of these professionals. This is by no means conclusive, and there are many differences exhibited in attitudes toward dentists by people of the same social class group.

There also are suggestions that younger and older dentists are felt to be different.

The younger, newly trained dentist is more apt to be thought of as better trained, more interested in the total person and not only in his teeth, to have better equipped offices, and so on. Personal experiences make for substantial differences in this regard, as do more basic feelings about dental care and dental appearance. The data relating to these differences are very incomplete, however, and this is an area that requires further study.

On a more general level, we find that when asked about feelings toward dentists, people are inclined to acknowledge the higher status position of these individuals, to make some comment referring to the fact that they are a necessity, that most of them are competent and do good work, and to voice in somewhat subdued terms a criticism of how dentists act, how they perform their work, or how they treat their patients. Over-all, there is a reluctance to be openly or sharply critical of this profession and its members. Similarly, people are prone to express feelings about other high status professions, especially those associated with body care. But the minor criticisms (which, at times when encouraged by the interviewer, take on a much stronger tone) are important to know about, for they refer to some of the less consciously held and at times more significant feelings laymen have toward dentists. The remainder of this section, therefore, gives emphasis to these facets of attitudes toward dentists, and is presented in a suggestive rather than definitive and conclusive manner.

Dentists Are Competent But Specialized • An assessment of the materials collected for this research indicates that increasingly dentists are regarded as a necessity in present day society. More and more the public expects dentists to be well trained professionals, men who can and do perform their work in terms of scientific knowledge, who possess a highly developed set of skills and technics, who make use of as many modern developments in this and related fields as is possible. Actual experiences with dentists do not always support this view, but there are suggestions that this image is taking hold. As previously mentioned, we find some preference for younger dentists, as if the assumption were that these men are more highly trained—and that they are farther removed from the stereotype of the old-fashioned "dentist."

Much of this suggests that the problem of dental care among the public needs to be viewed from a historical perspective. In a sense, dentistry is too new for all people to accept its possibilities for preventive care. Instead, they emphasize its corrective role. Time is required for this type of cultural change, and already upper middle class people (who typically are the first to accept such change) are well aware and make considerable use of the dentist who prevents oral decay. This new image moves slowly down through the class structure, until lower middle class, then lower class, people accept it and modify their personal behaviors in accordance with this view.

To hasten the dissemination and acceptance of this new image, it would seem that the dentist should be more broadly defined than is now the case. At present he tends to be seen as someone possessing specialized knowledge and technics, as not being as well educated as physicians, concerned with a limited (and more external than internal) portion of the body, and not completely identified with the broad, progressive, developing field of medicine.

> They're not as skilled as doctors. Dentists just work with gums and teeth, and a doctor does everything. A doctor is more friendly; he tells you what's wrong and doesn't try to hide it. They're friendlier than dentists, and more intelligent than any dentist I've been to.
> (LL, 20, Man)

> Dentists have to know almost as much as doctors. They care for your teeth and not

your body. Yet if you cared for your body you wouldn't have so much trouble with your teeth.

(UL, 51, Woman)

Dentists work on your teeth and doctors make you well when you're sick. Doctors go to the house and dentists don't. Doctors take you to the hospital and dentists don't have to.

(LL, 17, Boy)

A dentist is the smarter of the two. He can make as a good a living as a doctor and doesn't have to put in the hours. Actually, an M.D. has a whole lot more education.

(LM, 28, Man)

One of the problems in this status identification of dentists is that from the point of view of the public they are not as yet integral to the field of medicine. From a historical perspective, this profession has been moving closer to the field of medicine rather than coming from it.

In order to develop a more meaningful and prestigeful image of dentists, attempts should be made to keep the public informed of developments in dentistry —of new approaches to dental care problems, of new knowledge, of new tools. The public has become accustomed to expect such information from physicians on developments in the field of medicine. As of now most people think of the dentist more in terms of the old-fashioned, never-changing drill, than in terms of his knowledge. In many respects, he remains a person who is skilled in technics, more than one who goes about his work in terms of a specific body of scientific knowledge. Modifications of the image of dentists in this latter direction appear to be required.

It is of interest to note that we encounter little talk about fluoridation in these interviews. There is some reason to suspect that fluoridation has not been viewed as a contribution of dentists and therefore has not been of particular help in building a more desirable image of this profession. On this point, however, we cannot be conclusive.

Complaints Against Dentists • We find several common complaints directed at dentists. One is that dental costs are high, that dental care is expensive. Not everyone agrees with this (at least, to the point where it is specified), but enough mention is made so that it becomes worthwhile to comment on in this report.

Their prices are too high for me. That's why I don't have false teeth.

(LL, 40, Woman)

It seems to me that their prices are way out of line, even though they do have to go to school and all that. But, of course, if you are going to have their services you have to pay for it. I guess there's nothing you can do about it.

(LM, 58, Man)

Their offices are clean and have lots of equipment that I bet costs plenty. It seems they charge a lot, but they have to pay rent, so I guess they make it all back a little at a time.

(UM, 50, Man)

These complaints (and the type of complaint varies from one social class group to another) are not substantially different from those leveled at other professions. As one goes lower in the social scale, they become more severe; but in no circumstances do they fully account for why a person cares for or neglects his teeth. This economic protest appears to be related to the feeling that at certain times dentists have to be seen, and therefore the patient is obliged to pay the prescribed fee. It perhaps is connected with the notion that the results of the dentist's work are not always apparent; teeth still decay, the dentures still do not fit properly, and the like. And to some extent what people think of as too high a fee has to do with the professional identification of this individual, a factor probably more significant among higher status groups.

There is a tendency on the part of successful dentists to charge a fee that is out of pro-

portion to the position that I feel their profession should hold in the business community.
(UM, 45, Man)

Well, I guess we've just gotten hardened to the fees, but there aren't enough dentists, that's for sure. That would create more competition and this perhaps would lower the fees.
(UM, 39, Man)

A much more significant complaint pertains to the fact that "dentists hurt," and this reveals the underlying anxiety associated with getting dental treatment. This is widespread; it is involved in people's feelings about dentists and professional dental care—and for some probably acts as a deterrent to seeking more consistent and intensive dental care.

Pain is closely associated with all types of dental problems, and it continues until after the dentist finishes his work. Pain is involved not only in what the dentist does (though this is crucial), but also in the definition of this situation and the expectation of what will happen. In response to a picture depicting a patient at a dentist's office, where respondents were asked to make up a story about what is happening (and thereby project their own feelings on to this situation), these are some of the stories we are told:

I think she's there for a filling and I think she's nervous. She's frightened of the needle and he's telling her to relax, that it isn't going to be too painful. All she can think of is that she wants to hurry and get out of there. She has no desire to talk because that would just slow him up. The dentist probably is thinking he wishes he could get patients that weren't so nervous.
(UM, 37, Woman)

This woman is over 50 years old and the dentist is waiting for her to open her mouth. When she does she starts saying something about how long it has been hurting and how she hopes he doesn't hurt her more. I'm always concerned about how they'll hurt me. She wonders what he's going to do. She thinks, I've never had much done before and I hope I don't get nervous and I'll try to stand it but I hope it doesn't hurt too bad.
(UL, 58, Woman)

In describing their own experiences with dentists, the pain and anxiety theme almost invariably is expressed:

The last time I had a tooth that was bad I called him and he said to come in right away. . . . I sat in the chair, held the arms tight, a cold sweat came over me. I shut my eyes while he worked. I looked once and he already had it out.
(LM, 27, Woman)

Having a tooth pulled (in actuality or in fantasy) is a painful experience for most people, and the anxiety derives not only from the expectation of pain but also from the prospect of losing the tooth. But other aspects of the dentist's treatment are defined as painful and anxiety provoking, too: drilling, getting a shot to deaden the nerves, waiting for the dentist in the reception room and in his chair, seeing blood, and so on. In addition to the more realistic "physical" basis for these apprehensions, there are feelings about how dentists treat their patients and do their work which serve to complicate these attitudes.

The Dentist and His Relations with Patients • Dentists are not always thought to give to their patients the right type of attention, and either explicitly or implicitly are criticized for this. There is the matter of having trouble getting an appointment when it is needed: the dentist's schedule is too full for immediate treatment. There are complaints about having to wait in the reception room while the dentist finishes with another patient; and in the meantime the patient's tension builds up in anticipation of what will happen. There is the resentment directed against being put in "the chair" and waiting for the dentist until he returns from another patient he is treating. There is considerable mention of being treated too roughly, of pressing too hard on the drill, of "jabbing" the needle in, of pulling the tooth too hard, of suggesting hot packs when cold packs would have been better.

I went to get a tooth pulled and he kept drilling for three visits and he cut my gums and told me to put on hot packs. It still hurt, so after three days I went to a doctor and he told me to use cold packs and gave me a shot of penicillin. And it has never hurt since.
(LL, 24, Man)

They are always so busy they let you sit too long, which gives you too much time to think . . .
(UL, 51, Woman)

Anyone minds going to a dentist. I'd rather have one pulled than drilled. . . . Once I took my wife to the dentist. His office wasn't very clean and his equipment was old. He was rough too. I didn't think much of him, but she wanted to go there. He wasn't very clean.
(LM, 40, Man)

My own experiences with dentists have been with the work done on my bridge, and I feel that many dentists are careless or unprepared for work along this line. They seem to be weak on work with metals. Some of them I have known can't even read an x-ray any better than I can. . . . And I dislike having a dentist give me Novocaine just as a matter of routine. I would rather have him ask me first.
(UM, 36, Man)

I don't like their independent attitude when it comes to making an appointment. I'm a salesman and I try to fix my hours to suit my customers, and dentists never do.
(LM, 28, Man)

There are other complaints of these types, many similar to those directed at other professionals. But underlying a substantial portion of them are two important themes. One is an attempt to question whether the dentist is as highly skilled as he should be (or, more pointedly, whether he is as skilled as patients want him to be, given their feelings about pain and anxiety in relation to dental care of this sort).

In this sense, the dentist has not quite attained the level where he is seldom questioned by the layman, and it is likely that laymen sense that dentists are a bit uneasy about their occupational identity and status.

A second theme is that dentists do not take the patient into consideration so that the patient's tension will be reduced. In this sense the dentist is depicted as being aloof, remote from the individual. He at times is said to be concerned with a limited part of the patient rather than the whole being. According to this view, dentists are not friendly enough, they do not talk or explain to patients what they are doing, what the trouble is. Of course, there are many exceptions to this observation—some respondents talk about their dentist as being very friendly and helpful. But there is some tendency in this other direction, which serves to maintain an image of these men as being rather unconcerned with the patient's total welfare. Moreover, it emphasizes the feeling that dentistry is more a matter of repairing and pulling teeth than it is of preventing tooth decay.

These attitudes toward dentists are not always rooted in realistic considerations: in some ways they express feelings about teeth, dental trouble, the necessity to care for teeth lest they decay, the feeling that seeing a dentist is inevitable, the anxiety associated with what a dentist does. People are inclined to focus their apprehensions and resentments on almost any convenient excuse, and the aforementioned factors are well-suited for this. In turn, they are used by respondents to explain why more professional dental care is not obtained, and in this sense are used to defend dental negligence on the part of the individual.

Social Class and Experiences with Dentists • As a final point in this chapter we return to the concept of social class, found so useful in accounting for differential dental care attitudes and behaviors. For it is likely that the complaints and criticisms expressed by respondents do have some realistic basis, and that this in turn is a result of different types of experiences with different dentists.

Higher status people seek out, and most often find, a better type of profes-

sional service, and dental care does not appear to be an exception to this generalization. It is not only a matter of income, though this is important. It also involves the greater sophistication these people have about dental health, their greater interest in and knowledge of what dentists can do for them, and their more basic attitudes regarding preventive dentistry. From their experiences with dentists—and these experiences typically begin in early childhood and continue at regular intervals throughout life—they are more favorable to this professional and what he can and does do for them. This does not mean they feel that dentists are beyond criticism, or that there is no room for improvement. But it does suggest they seek out and get better treatment, are more realistic in their expectations of the dentist, and do not require precisely the same type of dental treatment (in both its medical and psychological meanings) that a lower status person needs to get.

In contrast, the lower status person seldom sees a dentist regularly, is not apt to have one dentist who has cared for his teeth over a long period of time, sees a dentist only in an emergency, gets remedial rather than preventive treatment, and finds his experience with this professional quite unfavorable—typically, reinforcing his stereotype of this individual and his attitudes toward dental neglect. Moreover, he does not always get the best of dental care from the dentist he sees—because of when he sees the dentist and because of the dentist he visits. The dentist catering to a lower class clientele probably approaches his work in a "realistic" manner: he knows who his patients are and what to expect from them. He probably defines his work as "fixing teeth," without attempting to preserve teeth or prevent further dental problems. He is not necessarily meticulous in the way he fills or pulls teeth, his office is not always very clean, and his instruments not the newest. And, further, he probably does not attempt to counsel his patients; he merely treats them.

Much of this is speculation on our part, inferred from what respondents say of their dental experiences and based on studies of other professional groups dealing with different social class levels. Certainly, all of this needs to be explored in more detail and tested with a larger body of information. But even these preliminary hypotheses suggest how the professional dental care at times works against increased concern with teeth and dental health. Experiences with some dentists, rather than effectively countering preconceived notions and fixed stereotypes regarding what dental health entails, at times strengthens these images and deters people from modifying their attitudes and behavior in this area.

VI. SUMMARY OF THE RESEARCH

In the preceding analysis we have presented a number of research observations pertaining to why people care for or neglect their teeth, with emphasis being given to those factors associated with the latter concern. Few of these observations can be considered as definitive or conclusive. All should be thought of as hypotheses for further research and testing, and all require further investigation and elaboration for a more complete understanding of attitudes and behaviors.

The data suggest that although dental health is in some ways a concern for all people, there are many factors which effectively work against increased care of the teeth. In part, these have to do with the meanings of teeth, the ways in which they become defined very early in life and how these meanings become

elaborated as a person grows and participates in his world. Social class considerations are of crucial importance in this area, and very clearly indicate that dental health education must be addressed not to a homogeneous population but to separate groups, each having their own style of life and unique sets of attitudes affecting their perception and ultimate acceptance of this type of self-care.

We also find that attitudes toward dental health touch on very central psychological and social concerns of people, some of which support dental health (as the role of teeth in a person's appearance) and some of which deter people from seeking better care for their teeth. These pertain to individual practices as well as the area of professional treatment and counsel. We encounter a complex of feelings about dentists, for example, which do not facilitate greater interest in dental health and in some respects work against this objective. We note that some attitudes toward the dental profession are not as favorable as might be desired, and such attitudes should be the subject of further inquiry and the object of remedial efforts.

This investigation has shown the desirability of further investigation of many of the areas referred to in this study. Much more attention should be given to the social class variable in this area—not only as a subject of study but in an attempt to determine how best to go about modifying these different attitudes and behaviors. Research on dental health attitudes and experiences in relation to different age groups would also be very worthwhile, and further study could deal intensively with young children, teenagers, young adults, middle-aged and old people in this connection. And, more generally, it would be useful to elaborate in much greater detail the dental care and neglect themes brought forth in this investigation, so as to determine in what form and manner dental health education might best be pursued.

From this preliminary analysis we conclude that dental health requires considerable redefinition in the public mind. There are all too few pleasures and gratifications associated with dental care. The personal and social satisfactions associated with these practices seldom are at the front of people's thinking; they tend to be well concealed behind the many more negative implications of this activity. Dental care at present is largely defined as a serious, demanding, uninteresting, repetitive experience. There is little notion of reward connected with it, but much of punishment. These types of association should be altered, and in their place emphasis given to the favorable implications of pleasant and rewarding personal and professional dental health practices.

Public education is a very long-term, complex undertaking. The American Dental Association has to date made a very effective contribution to public education in the area of dental health. The basic rules of good dental care are well understood by almost all people. Since this knowledge is better known than acted on in the lower middle and upper lower class groups, the objectives now are to give more impetus to carrying through on these "rules." This is likely to be a long range undertaking, and should be approached more in terms of the personal and social considerations it entails than the stereotype of "brush your teeth twice a day and see your dentist twice a year."

Book Reviews

CLINICAL PROCEDURES IN OCCLUSAL REHABILITATION

By S. Charles Brecker, D.D.S. 326 pages with 936 illustrations, including 7 colored plates. Index. $16. Philadelphia, W. B. Saunders Co., 1958.

In order to clarify the term "occlusal rehabilitation," the author in his introduction states, "When the restorations and treatment include the entire occlusion, then the procedure is referred to as occlusal rehabilitation."

Thus this volume is dedicated to the presentation of some of the practical phases of occlusal rehabilitation. A classification of cases of disorganized occlusion also is presented to form the basis of teaching the subject. In his preface, the author mentions several of his colleagues, who with their wide experiences aided him with some of the data.

Because of its simplicity, clarity and concise manner of presentation, this well written and adequately illustrated volume should be welcomed as an easily usable reference work, or for quick review. The text is detailed sufficiently for the average practitioner. It contains 17 chapters on various aspects of the titled subject. Theoretical considerations are but scantily considered. The book is easy to read and not so voluminous or detailed that the reader becomes lost in searching for basic principles. Even uncommon situations are treated clearly enough for one to develop quickly an understanding of what is involved, and what corrective measures seem indicated.

Although there are not many bibliographic references, they are well chosen. These are listed at the end of the chapters with which they are concerned. In addition, it would have been more expedient to have a reference index at the end of the book.

On page 150, Clinical Examination of the Teeth, the author states, "pulp-test doubtful teeth." This reviewer always has maintained that in all instances of rehabilitation, aside from a complete series of roentgenograms as suggested in the text, every remaining tooth be pulp-tested carefully. The time required for an infected pulp to become devitalized completely varies from a matter of days to years. Pulp degeneration may occur without any clinical signs or symptoms. Although an electric pulp test may indicate pulpal changes under certain conditions, the pulp tester cannot determine whether these changes indicate tendencies to return to normal or progressive degeneration, as the author states. An electric pulp test may indicate a vital pulp, although the entire coronal portion of the pulp may be necrotic, and the periapical roentgenographic evidence may be negative.

Despite these few criticisms, this book is a valuable contribution. Designed to present essential material in an integrated fashion with respect to function, Doctor Brecker's opinions are challenging, refreshing and provocative. He has succeeded in accomplishing his objective. The book will fill a need for practitioners who want a guide to some of the practical aspects of occlusal rehabilitation.

The format, paper and printing make the text a delight to read. The illustrations are good, and the index adequate.

E. Alan Lieban

W. K. KELLOGG FOUNDATION, ANNUAL REPORT, 1957

165 pages with 83 illustrations. Battle Creek, Mich., 1957.

Dentistry in the United States, Canada and Latin America received a total of $252,142 from the Kellogg Foundation fund during its fiscal year, ending Aug. 31, 1957. In the United States, $84,387 was apportioned to numerous educational and fact finding projects such as the Regional Dental Education Survey of the Southern Regional Education Board; the Survey of Dentistry ($250,000 of the $400,000 needed for a national survey will be contributed by the Foundation); aptitude testing for dental hygiene students through the American Dental Hygiene Association, and other important dental and public education programs.

Although the total of dental grants was proportionately small in the $5,283,939 of total disbursements for the 1957 reporting year, it is quite in keeping with the philosophy which the officers and trustees constantly apply in the numerous petitioning cases that the Foundation's role "is not that of an entrepreneur, but rather that of a catalytic agent to accelerate community self-help." In this sense, the $252,142 disbursed for dentistry can be counted as significant and productive of far reaching results for future advances in the profession.

Persons interested not only in dentistry, but

the entire field of public health, education, and welfare, will want to study this 1957 report of the Kellogg Foundation. Contributions in the fields of medicine, public health, hospitals, nursing, education and agriculture are enumerated and described. There is an exceptionally good foreword on "The Role of a Foundation," by Emory W. Morris, president and general director of the Foundation, and there are interesting and informative reports by the secretary and the treasurer. The treasurer's report includes a schedule of the Foundation's appropriations and payments for the fiscal year ending Aug. 31, 1957 and a list of securities held Aug. 31, 1957.

The Kellogg staff has succeeded in publishing a report which has exceptionally good visual appeal. Its liberal use of photographs and line drawings and its sepia on pure white color scheme have resulted in a report which is not only informative, but which is artistic as well.

B. F. Miller, III

BRITANNICA WORLD LANGUAGE DICTIONARY: A DICTIONARY OF SEVEN LANGUAGES

Edited by Charles Earle Funk and the editorial staff of the Encyclopaedia Britannica. 2 volumes. 2,065 pages with 1,520 illustrations. Triple index. $35. Chicago, Encyclopaedia Britannica Inc., 1956.

The well known "Funk & Wagnalls New Practical Standard Dictionary of the English Language" comprises the first part of this polyglot dictionary. The "Britannica World Language Dictionary" which comprises the second part attempts to give the equivalent of selected English words in six foreign languages: French, German, Italian, Spanish, Swedish and Yiddish (the last one transliterated into English characters).

The vocabulary used is limited to common words which have been determined by frequency counts and only one equivalent in each foreign language is given for each English word listed. Although there is a great need for a polyglot dictionary, this work does not fill it. Because many common English words have more than one meaning and, when translated into another language, may have even more, this dictionary is of limited use. Particularly it is inadequate for editors, researchers and others who want to obtain a clear understanding of the scientific contents of a manuscript written in a foreign language.

This inadequacy can be proved by a random example from the list "English to other languages." For the English verb "to abandon" the following translations are given: *abandonner* (French); *aufgeben* (German); *abandonare* (Italian); *abandoner* (Spanish) and so forth. To make a polyglot dictionary useful, however, the following equivalents should have been included: *laisser* and *renoncer* (French); *verlassen, preisgeben, überlassen* and *abstehen* (German); *lasciare* and *addarsi* (Italian); *dejar, desamparar, entregar* and *desertar* (Spanish), and so forth. The work is replete with similar inadequacies.

Layout, printing (especially of the numerous illustrations), paper and binding are of excellent quality.

Paul H. Glucksman

PHARMACOLOGY AND THERAPEUTICS

By Arthur Gollman, Ph.D., M.D. Third edition. 1,034 pages with 192 illustrations. Index. $12.50. Philadelphia, Lea & Febiger, 1958.

This is a medium-sized, medium-priced textbook, suitable for use by students in dentistry or medicine.

Most of the important new drugs and all of the important old ones are discussed by classes when practicable, relatively little space being devoted to individual drugs. Thus conciseness is achieved without sacrifice of coverage. Dental applications are mentioned occasionally, but are not featured. For example, the fact that lidocaine (Xylocaine) is useful in dentistry is mentioned, but very little information is given about lidocaine. Nordefrin (Cobefrin) is mentioned briefly without reference to its dental application.

The material is presented attractively and understandably. Charts, photographs and structural formulas are employed liberally. A few of the illustrations are in color.

The nomenclature is modern except for the Latin synonyms in the lists of official drugs which appear near the end of each chapter. Generic names are used routinely, and usually are differentiated clearly from trade names.

Despite its shortcomings with respect to a few dentally important drugs, this book is good enough to be considered seriously as a text for courses in pharmacology and therapeutics for dental students.

Donald A. Wallace

Deaths

Aiken, Edward M., Huntington Park, Calif.; Drake University College of Dentistry, Des Moines, 1904; died October 8; age 77.

Ammons, Willie V., Phoenix, Ariz.; Northwestern University Dental School, 1919; died January 3; age 60.

Anderson, John Fred, Winston-Salem, N. C.; Baltimore College of Dental Surgery, University of Maryland, 1909; died November 8; age 71.

Andrews, Joseph E., Pittsburgh, Pa.; University of Pennsylvania School of Dentistry, 1909; died January 13; age 71.

Arkin, William L., Kingston, N. Y.; New York University College of Dentistry, 1947; died January 20; age 32.

Atinsohn, Clara R., Bronx, N. Y.; College of Dental and Oral Surgery, New York, 1919; died December 1; age 67.

Beal, Wilbur L., Anaconda, Mont.; University of Denver School of Dentistry, 1915; died January 18; age 64.

Beck, Clara C., Moline, Ill.; Northwestern University Dental School, 1898; died December 31; age 78.

Beinker, Carl J., St. Louis; Washington University School of Dentistry, St. Louis, 1918; died November 20; age 68.

Bentley, Melton O., McMinnville, Tenn.; Milwaukee Medical College Dental Department, 1904; died October 20; age 82.

Bevard, Lloyd W., Chicago; Northwestern University Dental School, 1917; died January 6; age 67.

Black, Rhea Edwin, Chicago; Northwestern University Dental School, 1923; died October 15; age 60.

Black, Vance A., Charlotte, N. C.; Medical College of Virginia School of Dentistry, 1933; died January 24; age 52.

Blankenbaker, Ernest L., Richmond, Va.; Medical College of Virginia Dental Department, 1911; died January 17; age 72.

Borah, Oliver C., Olney, Ill.; Chicago College of Dental Surgery, 1910; died October 29; age 74.

Bouldin, Gaither L., Dickson, Tenn.; University of Tennessee College of Dentistry, 1910; died October 12; age 71.

Brown, Charles S., War, W. Va.; Baltimore College of Dental Surgery, University of Maryland, 1926; died November 22; age 56.

Brown, Richard A., Pensacola, Fla.; Atlanta-Southern Dental College, 1917; died January 25; age 65.

Brown, Thomas E., Antioch, Calif.; University of California College of Dentistry, 1937; died January 18; age 49.

Bruno, Joseph, Cleveland; Ohio State University College of Dentistry, 1930; died January 8; age 52.

Bunting, Clair M., Pittsburgh; University of Pittsburgh School of Dentistry, 1919; died January 13; age 62.

Burkhart, George A. P., Auburn, N. Y.; University of Buffalo School of Dentistry, 1901; died January 15; age 81.

Burns, Stewart O., Millburn, N. J.; University of Maryland Dental Department, Baltimore, 1914; died January 29; age 72.

Burrow, Charles C., Vale, Ore.; North Pacific College of Oregon, School of Dentistry, Portland, 1908; died January 20; age 75.

Butler, Edward Santley, New Rochelle, N. Y.; New York College of Dentistry, 1892; died January 20, age 90.

Calkins, Albert E., York, Neb.; Omaha Dental College, 1904; died January; age 80.

Camerden, Henry B., New York; New York College of Dentistry, 1901; died October 12; age 78.

Carter, John H., Cohoes, N. Y.; University of Pennsylvania School of Dentistry, 1905; died January 18; age 74.

Cary, Floyd C., Hutchinson, Kan.; Western Dental College, Kansas City, Mo., 1912; died December 28; age 72.

Cerf, Richard M., San Francisco; College of Physicians & Surgeons, San Francisco, 1915; died January 25; age 69.

Charles, Harry G., New York; New York College of Dentistry, 1917; died October 25; age 61.

Childs, Lowell L., Springville, N. Y.; University of Buffalo School of Dentistry, 1906; died January 1; age 84.

Churchill, George E., Alamosa, Colo.; University of Denver School of Dentistry, 1921; died January 28; age 61.

Clark, Benjamin F., San Jose, Calif.; University of Buffalo School of Dentistry, 1907; died January 2; age 71.

Connolly, John J., Glenside, Pa.; Philadelphia Dental College, 1907; died January 25; age 71.

Darmer, John E., Lincoln, Ill.; University of Illinois College of Dentistry, 1905; died December 29; age 73.

Denison, Ernest E., Evansville, Wis.; Marquette University Dental School, 1909; died January 4; age 78.

Dietzel, Fred C., Milan, Ohio; died January 25; age 74.

Dills, Irwin W., Shenandoah, Iowa; Kansas City Dental College, Kansas City, Mo., 1892; died June 19; age 89.

Douglass, George C., Davenport, N. Y.; New York College of Dentistry, 1900; died January 7; age 79.

Downs, William G., Evansville, Ind.; Vanderbilt University School of Dentistry, 1893; died October 29; age 86.

Drews, Arthur H., Oshkosh, Wis.; Marquette University Dental School, 1908; died September 16; age 75.

Drudge, George D., Detroit; University of Michigan School of Dentistry, 1918; died January 26; age 63.

Dupuy, Alford W., Birmingham, Ala.; Vanderbilt University School of Dentistry, 1896; died January 21; age 82.

Easton, Burt A., Poughkeepsie, N. Y.; University of Pennsylvania School of Dentistry, 1912; died January 1; age 77.

Esson, Achilles S., The Dalles, Ore.; North Pacific College of Oregon School of Dentistry, Portland, 1901; died January 20; age 83.

Feinman, Reuben, New York; Columbia University School of Dental and Oral Surgery, 1924; died October 24; age 56.

Fimple, Lorin S., Pueblo, Colo.; University of Denver School of Dentistry, 1917; died November 27; age 71.

Fink, Noel C., Mishawaka, Ind.; Indiana Dental College, 1924; died January 25; age 56.

Fleming, John M., Raleigh, N. C.; Baltimore College of Dental Surgery, University of Maryland, 1895; died December 18; age 90.

Foster, Bernard B., Pompano Beach, Fla.; University of Michigan School of Dentistry, 1915; died December 18; age 65.

Giese, Alfred G., Princeton, Wis.; Kansas City Dental College, Kansas City, Mo., 1899; died January 22; age 83.

Gillick, George O., Old Forge, N. Y.; Tufts College Dental School, 1943; died January 1; age 38.

Glicher, Jennie W., Brooklyn; Columbia University School of Dental & Oral Surgery, 1925; died November 23; age 70.

Gluesing, John W., Moline, Ill.; University of Iowa College of Dentistry, 1890; died October 14; age 91.

Goldberg, Irving H., Brooklyn; Tufts College Dental School, 1935; died January 10; age 47.

Goyert, Oscar H. F., Batesville, Ind.; Indiana Dental College, 1915; died January 23; age 67.

Grady, Clem W., Van Horne, Iowa; Drake University College of Dentistry, 1913; died July 25; age 67.

Hall, Kenneth H., White Bear Lake, Minn.; University of Minnesota School of Dentistry, 1943; died February 5; age 44.

Hammond, John J., Galesburg, Ill.; Chicago College of Dental Surgery, 1897; died January 10; age 81.

Harris, L. W., Alton, Ill.; Washington University School of Dentistry, St. Louis, 1923; died January 16; age 58.

Hartwell, Frain C., Detroit; University of Michigan School of Dentistry, 1922; died November 25; age 59.

Haviland, Holmes W., Kansas City, Kan.; Northwestern University Dental School, 1904; died January 18; age 77.

Heard, Coley R., Tuskegee, Ala.; Atlanta Dental College, 1908; died January 9; age 74.

Henes, Edgar L., Hamilton, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1905; died December 25; age 74.

Heyne, Charles H., Lyons, Neb.; Creighton University College of Dentistry, 1910; died January; age 80.

Hill, Harry M., Cleveland; Western Reserve University School of Dentistry, 1929; died November 30; age 51.

Hoffman, Jack P., Marion, Kan.; Western Dental College, Kansas City, Mo., 1919; died October 19; age 62.

Hooper, Harry C., Lynn, Mass.; Tufts College Dental School, 1927; died January 16; age 58.

Horenstein, David M., Arverne, N. Y.; New York College of Dentistry, 1916; died October 4; age 65.

Hoskins, George A., Chicago; Northwestern University Dental School, 1924; died January 11; age 67.

Hurley, Martin C., Clinton, Iowa; University of Iowa College of Dentistry, 1924; died October 23; age 55.

Hutchinson, Austin P., St. Petersburg, Fla.; University of Pittsburgh School of Dentistry, 1923; died January 19; age 56.

Hyman, Harold P., Brooklyn; Baltimore College of Dental Surgery, University of Maryland, 1941; died January 2; age 41.

Jirka, Irwin G., Berwyn, Ill.; Chicago College of Dental Surgery, 1910; died January 6; age 73.

Johnson, Llewellyn R., New Albany, Ind.; Louisville College of Dentistry, 1911; died November 17; age 67.

Kamen, Nathan H., New York; New York University College of Dentistry, 1938; died January 25; age 43.

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Announcements

MEETINGS OF THE AMERICAN DENTAL ASSOCIATION

Ninety-Ninth Annual Session	Nov. 10-13, 1958	Dallas, Texas
One-Hundredth Annual Session	Sept. 14-18, 1959	New York
One-Hundred and First Annual Session	Oct. 17-20, 1960	Los Angeles
One-Hundred and Second Annual Session	Oct. 16-19, 1961	Philadelphia

MEETINGS OF CONSTITUENT SOCIETIES

State	Date	Place	Secretary	Address
Alabama	Apr. 19-22, 1959	Birmingham	C. R. Crook	Professional Center, Montgomery
Alaska	June 3-6	Palmer	C. L. Polley	Box 1896, Juneau
Arizona			W. G. Burke	15 E. Monroe St., Phoenix
Arkansas	Apr. 12-15, 1959	Little Rock	D. M. Hamm	Box 89, Clarksville
California	Apr. 20-22, 1959	San Francisco	W. J. Healy	450 Sutter St., San Francisco
S. California			S. M. Silverman	903 Crenshaw Blvd., Los Angeles 19
Colorado	Oct. 5-8	Colorado Springs	G. H. Jackson	724 Republic Bldg., Denver
Connecticut			E. S. Arnold	37 Linnard Rd., W. Hartford
Delaware			A. G. Schiek	3716 Philadelphia Pike, Claymont
District of Columbia	Mar. 15-18, 1959	Washington	J. F. Keaveny	1029 Vermont Ave., N.W., Washington
Florida			G. J. Perdigon	17 Davis Blvd., Tampa
Georgia	Oct. 12-15	Atlanta	F. M. Butler, Jr.	Bankers Insurance Bldg., Macon
Hawaii	June 15-19	Honolulu	J. H. Dawe	810 N. Vineyard St., Honolulu
Idaho	June 16-18	McCall	G. L. Williamson	100 3½ Main St., Boise
Illinois			P. W. Clopper	632 Jefferson Bldg., Peoria
Indiana			W. R. Shoemaker	Citizens Bank Bldg., Anderson
Iowa			H. I. Wilson	Insurance Exchange Bldg., Des Moines
Kansas			F. A. Richmond	Brotherhood Bldg., Kansas City 1
Kentucky	Apr. 5-8, 1959	Louisville	A. B. Coxwell, Jr.	2208 Dundee Rd., Louisville 5
Louisiana	Apr. 1-4, 1959	Shreveport	J. S. Bernhard	2515 Line Ave., Shreveport
Maine	June 19-21	Rockland	S. M. Gower	Box 27, Skowhegan
Maryland			C. L. Inman, Jr.	Medical Arts Bldg., Baltimore
Massachusetts			H. E. Tingley	12 Bay State Rd., Boston 15
Michigan	Apr. 20-22, 1959	Grand Rapids	F. Wertheimer	Michigan Dept. of Health, Lansing
Minnesota	Apr. 13-15, 1959	Minneapolis	C. V. E. Cassel	2236 Marshall Ave., St. Paul 4
Mississippi	June 9-11	Biloxi	B. A. Cohen	500-E E. Woodrow Wilson Dr., Jackson 27
Missouri			E. D. Suggett	Merchants Bank Bldg., Jefferson City
Montana			R. C. Ritter	28 N. Black St., Bozeman
Nebraska	Apr. 26-29, 1959	Lincoln	F. A. Pierson	Federal Securities Bldg., Lincoln
Nevada	June 12-15	Lake Tahoe	O. M. Seifert	755 Ryland Ave., Reno
New Hampshire	June 22-24	Whitefield	F. E. Williams	814 Elm St., Manchester
New Jersey			J. G. Carr	407 Cooper St., Camden
New Mexico			J. S. Eilar	7 Medical Arts Sq., N.E., Albuquerque
New York			C. A. Wilkie	1 Hanson Pl., Brooklyn 17
North Carolina			L. H. Butler	Jefferson Bldg., Greensboro

State	Date	Place	Secretary	Address
North Dakota			J. H. Pfister	419½ Dakota Ave., Wahpeton
Ohio	Sept. 28-Oct. 1	Cincinnati	E. G. Jones	185 E. State St., Columbus
Oklahoma			L. D. Wright	Osler Bldg., Oklahoma City
Oregon	Mar. 2-4 1959	Portland	T. D. Holder	Selling Bldg., Portland
Panama Canal Zone			W. R. Bond, Jr.	U.S.A., Ft. Kobbe Dental Clinic, Ft. Kobbe
Pennsylvania			M. D. Zimmerman	217 State St., Harrisburg
Puerto Rico	Jan. 1959	San Juan	J. E. Munoz	Loiza and Del Rio Sts., San Juan
Rhode Island	Jan. 20, 21, 1959	Providence	H. A. McGuirl	Union Trust Bldg., Providence
South Carolina			J. E. Wallace	1506 Gregg St., Columbia
South Dakota			R. E. Decker	Box 308, Parker
Tennessee			K. P. Ezell	116 N. Academy, Murfreesboro
Texas	May 3-6 1959	San Antonio	C. A. McMurray	Alexander Bldg., Ennis
Utah			R. C. Dalgleish	State Capitol Bldg., Salt Lake City
Vermont	June 27-29	Manchester	E. H. Van Santvoord	22 Washington St., Rutland
Virginia			W. T. McAfee	Colonial National Bank Bldg., Roanoke
Washington	April 6-8, 1959	Seattle	G. D. Dore	211 Medical Dental Bldg., Seattle 1
West Virginia	July 20-23	White Sulphur Springs	G. N. Casto, Jr.	710½ Lee St., Charleston
Wisconsin	Apr. 27-29, 1959	Milwaukee	C. J. Baumann, Jr.	606 W. Wisconsin Ave., Milwaukee
Wyoming	June 19-21	Casper	T. J. Drew	State Office Bldg., Cheyenne

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

State	Date	Place	Secretary	Address
Alabama	June 22-27* June 23, 24	Birmingham	W. L. McCarty	Professional Center, Montgomery
Alaska	July 8-11* July 8, 9†	Anchorage	R. H. Williams	Box 2122, Juneau
Arizona	June 23-30	Florence	W. G. Biddulph	1502 W. Osborn Rd., Phoenix
Arkansas	June 16-20	Little Rock	W. T. Jones	107 E. Shelton, Monticello
California	June 16 June 23	San Francisco Los Angeles	D. R. Grant	507 Polk St., San Francisco
Colorado	June 22-28	Denver	R. F. Gilmore	Republic Bldg., Denver 2
Connecticut	June 23-25* June 27, 28* June 26† June 27, 28†	Boston Bridgeport Bridgeport Bridgeport	C. G. Brooks	302 State St., New London
Delaware	June 30*† July 1-3*†	Philadelphia Wilmington	P. K. Musselman	143 W. Main St., Newark
District of Columbia			W. T. Birthright	1855 Eye St., N.W., Washington
Florida	July 6-17* July 7, 8†	Jacksonville	R. P. Taylor, Jr.	P. O. Box 2913, Jacksonville 3
Georgia	June 9-11	Atlanta	W. G. Brown	Blacksbear
Hawaii	Aug. 28-Sept. 1‡		J. Y. Ing	James Campbell Bldg., Honolulu
Idaho	June 23-25	Boise	A. G. DeWinter	Sun Bldg., Boise
Illinois	June 24-27	Chicago	W. A. McKee	Wood Bldg., Benton
Indiana	June 10-13*†	Indianapolis	C. A. Frech	Gary National Blank Bldg., Gary
Iowa	June 2-6*†	Iowa City	P. A. Hahn	Farmers & Merchants Bank Bldg., Burlington
Kansas	June 2-5	Kansas City, Mo.	G. L. Teall	Box 71, Hiawatha
Kentucky	June 9-12*†	Louisville	J. J. Kelly	102 W. Madison St., Franklin
Louisiana	June 2-7	New Orleans	R. C. Steib	Maison Blanche Bldg., New Orleans
Maine			A. S. Appleby	Box 260, Skowhegan
Maryland	June 9-11‡		W. D. Burton	829 Park Ave., Baltimore 1
Massachusetts	June 9-13*‡ June 12, 13†‡		C. R. Williams	70 Washington St., Salem
Michigan	June 8-14		J. L. Champagne	3714 W. McNichols Rd., Detroit 21
Minnesota	June 16-20* June 16, 17†	Minneapolis	E. A. Nelson	2236 Marshall Ave., St. Paul 4 W

State	Date	Place	Secretary	Address
Mississippi	June 17-19*†	Jackson	A. H. Richter, Jr.	Aven Bldg., Greenwood
Missouri	June 9-11, 16, 17*	Kansas City	R. R. Rhoades	Central Trust Bldg., Jefferson City
	June 12-14, 16-17*	St. Louis		
Montana	July 14-17‡		R. O. Betzner	303 Power Block, Helena
Nebraska	June 5-11	Lincoln	H. E. Weber	Stuart Bldg., Lincoln
Nevada	June 16	Reno	R. Whitehead	40 W. First St., Reno
	Dec. 7			
New Hampshire	June 19, 20*	Boston	S. G. Markos	8 Renaud Ave., Dover
	June 19†			
New Jersey	June 5, 6*	New York	C. J. Schweikhardt	150 E. State St., Trenton 8
	June 9, 10*	Philadelphia		
	June 13, 14*	Trenton		
	June 18†	Teaneck		
	June 23, 24*	Philadelphia		
New Mexico	June 23-26	Santa Fe	J. J. Clarke, Sr.	Artesia
New York	June 19, 24, 25†‡		D. W. Beier	23 S. Pearl St., Albany 7
	June 19, 20, 24-27*‡			
	Dec. 2-5, 8, 9*†			
North Carolina	June 23*†	Chapel Hill	J. H. Guion	Doctors Bldg., Charlotte 7
North Dakota	July 7-11	Fargo	G. F. Wirtz	Clinic Bldg., Mandan
Ohio	June 12-14*	Cleveland	D. E. Bowers	322 E. State St., Columbus 15
	June 18-20*	Columbus		
	June 21-25*	Columbus		
	June 21†	Columbus		
Oklahoma	June 23-25*	Oklahoma City	W. H. Stephens	Plaza Court Bldg., Oklahoma City
	June 23, 25†			
Oregon	June 9-12	Portland	F. L. Utter	Pioneer Trust Bldg., Salem
Pennsylvania	June 5-7*†	Philadelphia	R. E. V. Miller, Sr.	Dept. of Public Instruction, Box 911, Harrisburg
	June 16, 17*†	Philadelphia and Pittsburgh		
	June 18-20*†	Philadelphia		
Puerto Rico			J. Mercado C.	Comercio St. #452, San Juan
Rhode Island			F. M. Hackett	267 Academy Ave., Providence
South Carolina	June 19-21‡		W. J. Brockington	1508 Washington St., Columbia 1
South Dakota	June 22-25*†	Sioux Falls	H. T. Aker	Canton
Tennessee	June 9-13	Memphis	C. R. Aita	Bennie-Dillon Bldg., Nashville
Texas	June 7-13*	Dallas	R. T. Weber	Capital National Bank Bldg., Austin 16
	June 7-9†			
Utah	June 23-28‡		M. T. Rigby	47 E. Center St., Midvale
Vermont	June 23-25*†	Burlington	P. M. Fitch	Newport
Virginia			J. M. Hughes	Medical Arts Bldg., Richmond
Washington			F. S. Rotchford	1108 S. Washington St., Olympia
West Virginia	June 23-25	West Liberty	C. C. Cottrill	Box 111, Glen Rogers
Wisconsin	June 9-13*†	Milwaukee	S. F. Donovan	Tomah
Wyoming	June 23-25*†‡		E. E. Edwards	Bank of Commerce Bldg., Sheridan

Most states require applications to be in 30 days prior to examination date.
*Dental examination. †Dental hygiene examination. ‡Write to secretary of dental examining board for information on locations of examinations.

MEETINGS OF OTHER ORGANIZATIONS

Name	Date	Place	Secy. or Chm.	Address
American Academy of Gold Foil Operators	Nov. 7, 8	Dallas	C. C. Latham Secy.	1125 Tenth St., Coronado, Calif.
American Academy of the History of Dentistry	Nov. 7	Dallas	M. B. Asbell Secy.	25 Haddon Ave., Camden, N.J.
American Academy of Implant Dentures	Nov. 7-9	Dallas	A. N. Cranin Secy.	2120 Ocean Ave., Brooklyn 29
American Academy of Oral Roentgenology	Nov. 7, 8	Dallas	T. S. Grant Secy.	508 16th St., Oakland, Calif.
American Academy of Pedodontics	Aug. 28-30	St. Louis	W. E. Cody Secy.	1325 E. 16th Ave., Denver
American Academy of Periodontology	Nov. 6-8	Dallas	C. E. Chamberlain Secy.	1101 N. North St., Peoria, Ill.
American Association of Dental Editors	Nov. 9	Dallas	A. H. Kutscher Secy.	400 N. 8th Ave., Highland Park, N.J.
American Association of Dental Examiners	Nov. 7, 8	Dallas	C. A. Bumstead Secy.	Stuart Bldg., Lincoln, Neb.
American Association of Dental Schools	Nov. 9	Dallas	M. W. McCrea Secy.	School of Dentistry, University of Minnesota, 127 Owre Hall, Minneapolis

Name	Date	Place	Secy. or Chm.	Address
American Association of Public Health Dentists	Nov. 8	Dallas	P. Ayres Secy.	Box 2591, Jefferson County Dept. of Health, Birmingham, Ala.
American Board of Dental Public Health	Nov. 6, 7	Dallas	C. V. Tossy Secy.	Michigan Dept. of Health, Lansing, Mich.
American Board of Oral Pathology	Dec. 6, 7		D. A. Kerr Secy.	University of Michigan, School of Dentistry, Ann Arbor, Mich.
American Board of Oral Surgery	Aug. 2 Dec. 1 Apr. 2-6, 1959	Chicago Chicago	L. M. FitzGerald Secy.	Roshek Bldg., Dubuque, Iowa
American Board of Pedodontics	July 29-31	Indianapolis	R. L. Ireland Secy.	College of Dentistry, University of Nebraska, Lincoln 8, Neb.
American College of Dentists	Nov. 9	Dallas	O. W. Brandhorst Secy.	4221 Lindell Blvd., St. Louis
American Dental Assistants Association	Nov. 10-13	Dallas	M. L. Martin Exec. Secy.	First National Bank Bldg., La Porte, Ind.
American Dental Assistants Certification Board	Oct. 8		F. Smith	23 W. 33 St., Bayonne, N.J.
American Dental Hygienists' Association	Nov. 10-13	Dallas	M. E. Swanson Exec. Secy.	100 E. Ohio St., Chicago
American Dental Society of Anesthesiology	Nov. 8, 9	Dallas	H. A. Sultz Secy.	249 Linwood Ave., Buffalo
American Dental Society of Europe	July 2-5	Knokke, Belgium	J. P. Molony Secy.	110 Harley St., London W.1, England
American Denture Society	Nov. 7, 8	Dallas	V. L. Steffel Secy.	College of Dentistry, Ohio State University, Columbus, Ohio
American Institute of Dental Medicine	Oct. 12-16	Palm Springs, Calif.	M. Lewis Exec. Secy.	2240 Channing Way, Berkeley 4, Calif.
American Society for the Advancement of General Anesthesia in Dentistry	Oct. 27	New York	M. H. Feldman Exec. Secy.	730 Fifth Ave., New York 19
American Society of Dentistry for Children	Nov. 7-9	Dallas	R. E. McDonald Secy.	School of Dentistry, Indiana University, 1121 W. Michigan St., Indianapolis
American Society of Oral Surgeons	July 30-Aug. 2	Chicago	A. B. Coxwell Exec. Secy.	2208 Dundee Rd., Louisville 5, Ky.
Ark-La-Tex Dental Congress	Aug. 18	Shreveport, La.	J. Wyrick Secy.	Texarkana National Bank, Texarkana, Texas
Arpa Internationale, Twenty-fifth Congress	July 7-12	Paris, France	A. J. Held Pres.	Institute Universitaire de Medecine Dentaire, 24 rue Micheli-du-Crest, Geneva, Switzerland
Association of American Women Dentists	Nov. 10	Dallas	M. B. McCann Secy.	2600 N. McCullough, San Antonio, Texas
Austrian Dental Association	Sept. 18-21	Salzberg, Austria	K. Czerwenka	Franz Josef Strasse 12, Salzburg, Austria
Berkshire Conference (Ninth)	June 15-19	Lenox, Mass.	I. Glickman Dir.	Tufts University, School of Dental Medicine, 136 Harrison Ave., Boston 11
British Dental Association	July 7-12	Dundee, Scotland	H. P. Buchanan Secy.	13 Hill St., Berkeley Square, London W.1, England
Canadian Dental Association	Oct. 26-29	Montreal	D. W. Gullett Secy.	234 St. George St., Toronto 5, Canada
Chicago Dental Society	Feb. 8-11 1959	Chicago	K. S. Richardson Exec. Secy.	30 N. Michigan Ave., Chicago
Congress of Stomatologists of Yugoslavia (Second)	Sept. 18-20	Beograd, Yugoslavia	P. Stosic Secy.	Stomatoloski fakultet, Beograd, Rankeova 4, Yugoslavia
Council on Dental Education, Dental Aptitude Tests	Oct. 3, 4		S. Peterson Secy.	222 E Superior St., Chicago 11
Cuban National Dental Congress (Fifth)	Nov. 14-17	Havana	C. Funcia C.	No. 353, Vedado, Havana, Cuba
Detroit District Dental Society	Nov. 24, 25	Detroit	S. Silverman Chm.	6426 Van Dyke Ave., Detroit 13
Endodontics, Second International Conference	June 22-28	Philadelphia	M. Kolb Secy.	4001 Spruce St., Philadelphia 4

Name	Date	Place	Secy. or Chm.	Address
European Orthodontic Society	July 4-8	Copenhagen, Denmark	A. Bjork	Royal Dental College, 4, Universitetsparken, Copenhagen, Denmark
Federation Dentaire Internationale, 46th Annual Meeting	Aug. 27-Sept. 3	Brussels, Belgium	G. H. Leatherman Secy.	35 Devonshire Pl., London W.1, England
Greater New York Dental Meeting (Thirty-fourth)	Dec. 8-12	New York	M. Purdy Exec. Secy.	Statler Hotel, New York 1
International College of Dentists	Nov. 9	Dallas	H. O. Westerdahl Secy.	4829 Minnetonka Blvd., Minneapolis
International Dental Meeting of Paris (Thirty-second)	Nov. 24-30	Paris, France	R. A. Robert Gen. Secy.	10, rue de l'Isly, Paris 8, France
Italian Society of Dentistry and Maxillo-facial Surgery	Sept. 3-7	Pavia, Italy	S. Palazzi Dir.	Clinica Odontoiatrica, Universita di Pavia, Pavia, Italy
Mid-Continent Dental Congress	Oct. 12-15	St. Louis	J. E. Brophy Exec. Secy.	8013 Maryland Ave., Clayton 5, Mo.
Mississippi Conference on Periodontia and Dental Medicine	Aug. 13, 14	University, Miss.	D. C. Trexler Dir.	Dept. Conferences, Institutes, and Short Courses, University of Mississippi, University Extension, University, Miss.
National Association of Seventh Day Adventist Dentists	Nov. 7-9	Dallas	G. H. Curtis Secy.	Medical College of Evangelists, Dental School, Loma Linda, Calif.
National Board of Dental Examiners	Dec. 1, 2		G. J. Casey Secy.	222 E. Superior St., Chicago 11
National Dental Association, Inc.	Aug. 3-7	Pittsburgh	E. N. Jackson Secy.	P. O. Box 197, Charlottesville, Va.
New England Dental Society	Oct. 21, 22	Boston	W. F. O'Meara Secy.	904 Main St., Hartford, Conn.
New Orleans Dental Conference (Eleventh)	Nov. 23-26	New Orleans	A. A. Copping Secy.	4704 Paris Ave., New Orleans
Northern Brazil First Congress	July 7-12	Macapa	J. M. Lima Gen. Secy.	Central Committee on Organization, First Congresso Nortista de Odontologia, Macapa, Amapa, Brazil
Odontological Federation of Central America and Panama, Second International Convention	Nov. 26-29	San Jose, Costa Rica	R. Chartier Chm.	P.O. Box 698, San Jose, Costa Rica, C.A.
Odontological Society of Western Pennsylvania	Sept. 30-Oct. 2	Pittsburgh	H. D. Butts, Jr. Secy.	Jenkins Bldg., Pittsburgh 22
Pan-American Dental Congress	Nov. 18-22	Mexico City, Mexico	Secretary	Asociacion Dental Mexicana, Sinaloa 9, Mexico 7, D. F., Mexico

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BARBADOS, BRITISH WEST INDIES—For health reasons, must sell. Attractive for semi-retired person or one needing warm, healthy climate all year. Price: $12,000, rent $30 monthly; nurse $10 weekly; technician $12 weekly. Equipment, old Ritter, instrument case, new x-ray, full laboratory. Easily make $12,000 yearly. American or Canadian diplomas accepted. Write to Dr. Barbara Lloyd-Still, 2016 Plantations Bldg., Bridgetown, B.W.I.

•

CALIFORNIA—Canoga Park. Orthodontist suite available for lease in a general medical building with very active practice at 7222 Owensmouth Ave. V. W. Foster, M. D.

•

CALIFORNIA — Orthodontist — design your own suite in dental building to be constructed in suburban Los Angeles. Building will feature garden suites, air conditioning and free off-street parking for doctor and patients. No orthodontist within five miles. Address A.D.A. Box No. 700.

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CALIFORNIA—Opportunity to buy separate residence and office with edgewise orthodontic practice. Owner has already moved to another distant community but is now commuting. Good starting practice and excellent potential. Write Dr. W. N. Cotton, 6515 Wilshire Blvd., Los Angeles 48, Calif.

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COLORADO—For sale, $55,000 a year practice. Lovely new six room office building with two fully equipped operating rooms. Rapidly growing town; population 10,000; mountains; splendid climate; excellent hunting and trout fishing. Dentist leaving to specialize. Equipment and practice must be sold; will sell or lease building; $10,000 cash required. Address A.D.A. Box No. 842.

•

COLORADO—For sale or lease, busy two-chair residential dental office in Denver. Address A.D.A. Box No. 904.

•

CONNECTICUT—For sale. Three-chair modern, general practice dental office in air-conditioned building. $10,000; terms. Dentist age 47 will stay with buyer for six months and share expenses, refer patients and then retire to Florida. Address A.D.A. Box No. 534.

•

CONNECTICUT—For sale. Two-chair office with general practice grossing over $30,000. Excellent location. Dentist leaving state. Price, $8,500. Terms if desired. Address A.D.A. Box No. 971.

FLORIDA—Miami. For sale. One-chair dental office, fully equipped in centrally located air-conditioned building. Established 31 years, reasonably priced, good opportunity. Contact Mrs. Idus W. Shields, 498 S.W. 29th Road, Miami 36, Fla.

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FLORIDA—Office for rent. Entirely new building in progressive community, air conditioned and central heat. Practicing physician next door. Area draws on Anna Maria Island, Long Boat Key and mainland. Ample parking. All the work you can handle year around, if your work is good. Very reasonable rental. Details on request. Contact Dr. O. B. Pavlin, Box 788 Bradenton Beach, Fla.

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FLORIDA—Orlando. Two-chair completely equipped office and practice established 1946. Located first floor downtown office building occupied by dentists, physicians and lawyers. Available immediately. Address A.D.A. Box No. 972

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FLORIDA—Palm Beach. For rent. Fully equipped office, waiting room, business office, two operatories, laboratory, dark room, on ground floor. Best location. Retiring on account of illness. Address A.D.A. Box No. 973.

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FLORIDA—Space available for dentist in small medical clinic now under construction on St. Petersburg Beach. Contact Peter J. Palmisano, M. D., 5995 Gulf Blvd., St. Petersburg Beach, Fla.

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GEORGIA—For sale. Most unique first floor suite with reception room opening on to foyer of theatre lobby in Atlanta's exclusive northside suburb of Buckhead, drawing from an area of unbelievable purchasing power. Handsomely appointed throughout with beautiful reception room, two private offices, large secretary's area, roomy corridor and three operatories, two equipped with new Ritter Tri-Dents, Ritter x-ray and motor chairs; a third operatory with new S. S. White motor chair and Air Dent. Owner has practiced here for 30 years and has reputation for good dentistry, square dealing and at the best fees; general practice largely rehabilitative dentistry; five years remain on lease at $250 per month. Owner is ill but is able to make transfer of practice. The right man can acquire for something less than $20,000 with reasonable terms. Dr. J. Hugh Crossett, Buckhead Theatre Building, Atlanta 5, Ga.

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GEORGIA—For sale. Modern dental building, practice and small home in city of 4,000. Fully equipped, central air conditioning, central Vacudent, four operatories, two

reception rooms, business office, private office and large laboratory. Office built 1950—home 1952. Good fees, high type ethical practice which grossed $45,000 in 1957. No other dentist in 20 miles. Moving due to illness in family. Sell for inventory. Address A.D.A. Box No. 974.

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ILLINOIS—For sale. Well established dental practice in northern Illinois. Four-chair operating rooms and x-ray. Excellent downtown location. Wide surrounding area dependent on dentist here. Good opportunity. Address A.D.A. Box No. 935.

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ILLINOIS—Wanted. Illinois licensed oral surgeon trained in general anesthesia, to take over or lease active oral surgery practice. State qualifications. Address A.D.A. Box No. 984.

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INDIANA—For sale. Two-chair fully equipped (including x-ray) three-room office attached to modern seven-room house. Two-car garage. Practice established 25 years. Small west central Indiana county seat town. No other dentist. Deep freeze, all draperies and part of furniture included. $10,000. Address A.D.A. Box No. 975.

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IOWA—For sale. Attractive two-chair office. Very active practice in pleasant southern Iowa town; population 6,000. Address A.D.A. Box No. 905.

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IOWA—Very attractive ground floor office. Space for two chairs, business office, reception room, dark room, all new. Ideal for a dentist coming out of school or military service desiring to build a large practice. For complete information contact Arthur Wellemeyer, Klemme, Iowa.

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KANSAS—For sale. Fully equipped dental office. Has three Ritter units, chairs, cabinets, also well equipped laboratory. Located in Garden City, Kan. Reasonable terms. For information write Dr. A. B. Gardner, 514 E. Mill St., Porterville, Calif.

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MARYLAND—Silver Spring (Wheaton area). For sale. Modern, well equipped home-office in excellent location. Established practice. Low down payment. Address A.D.A. Box No. 976.

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MASSACHUSETTS—For rent. Dental offices of the late Dr. Knapp in center of Pittsfield, Mass., consisting of two operating rooms, x-ray room, laboratory and reception room, all equipped. Dr. Knapp occupied this location 28 years; died August 1957. Contact W. T. Butler, Box 877, Pittsfield, Mass.

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MICHIGAN—For sale. Northwestern section, lower peninsula. Attractive brick and stone modern one-story dental building at present occupied by physician. Room for combined offices or living quarters. Excellent opportunity. Address A.D.A. Box No. 822.

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NEW JERSEY—For sale. Active practice, equipment and office consisting of three modern operating rooms, receptionist's office, private office, reception room, etc. Centrally air conditioned. Five room apartment above office. Leaving to specialize. Dr. Carl E. Housekeeper, 216 S. Main St., Pleasantville, N. J.

NEW JERSEY—For sale. Fully equipped two-chair beautiful office with provision for third; large drawing population, splendid opportunity, specializing. Dr. H. Kraut, 33 Harding Rd., Red Bank, N. J.

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NEW YORK—Attention June graduates. For sale. Fully equipped dental office and practice in growing community on Long Island. Established 15 years. Reasonably priced. Owner leaving state. Address A.D.A. Box No. 977.

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NEW YORK—Opportunity in established and still growing community in Westchester county. Newly constructed fully equipped office and adjoining apartment suitable for residence or further expansion. Address A.D.A. Box No. 985.

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NORTH CAROLINA—For sale. Fully equipped office in prosperous North Carolina community; leaving state. Excellent opportunity for this year's graduate. Write to Box 5103, Ardmore Station, Winston Salem, N. C.

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OHIO—Attention June graduates. Available September, fully equipped air-conditioned, one-chair office for sale in Akron. Second operatory is fully wired and plumbed. Ground floor. Practice established three years; leaving to specialize. Address A.D.A. Box No. 909.

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OHIO—For sale. Active practice in small Ohio town with large surrounding area. Pleasant home and office combination. Twenty miles north of Dayton. No other dentist. Present dentist retiring. Address A.D.A. Box No. 978.

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OREGON—For sale. Established practice, new modern two-chair office, ground floor, off-street parking, college town, $12,500; leaving because of health. Address A.D.A. Box No. 845.

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PENNSYLVANIA — Excellent opportunity. Optometrist wishes to share air-conditioned office in Harrisburg's largest shopping center; 240 sq. ft. (20'x27'), water available, low overhead, new neighborhood. M. Sasson, O.D. 41 Kline Village. Telephone Cedar 6-0865.

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PENNSYLVANIA—Completely equipped one-chair office, Ritter G-Unit, chair, x-ray, etc. All new equipment and office furnishings. Growing practice in expanding southeastern Pennsylvania city. May continue practice or priced to transfer equipment. Specializing. Address A.D.A. Box No. 979.

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PENNSYLVANIA — For sale. Combination home and dental offices in Lancaster county. Two completely equipped operating rooms. Active practice. Excellent opportunity. New gas heating unit. Immediate possession. Leaving to specialize. Address A.D.A. Box No. 980.

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TENNESSEE—For sale. Two-chair office equipped with Ritter H-1 unit and S. S. White unit; approximately 600 square feet located in downtown professional building; county population 375,000. Buyer should gross $15,000 first year. Address A.D.A. Box No. 981.

WEST VIRGINIA—For sale or lease. Long established two-chair air-conditioned office in heart of business district. Leaving in September to specialize. Write Dr. Jack R. Martin, 304 Kanawha Banking & Trust Bldg., Charleston 1, W. Va.

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WISCONSIN—For sale. Dental office, equipment, home in Green County; because of death of Dr. E. O. Osborne. County seat close; good surrounding territory; near Madison, reasonably priced, excellent opportunity. Contact Mrs. E. O. Osborne, Albany, Wis.

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WISCONSIN—Because of recent death, low rental dental office available in this heavily populated farming and fishing area. Complete equipment to buy or rent. Share newly remodeled ground floor offices with physician and optometrist. Will help finance equipment and house. Young man preferred. Call or write Don Hagen, Woodville, Wis. Phone 2171.

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WISCONSIN—Wanted. Dentist for general practice in eastern Wisconsin. 4,000 population, surrounded by small towns and center of rich agricultural area, near industrial center and lake region. Modern office available. Address A.D.A. Box No. 982.

OPPORTUNITIES AVAILABLE

CALIFORNIA — Qualified pedodontist for group dental practice, full time. Experience preferable. Write A.D.A. Box No. 943.

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CALIFORNIA—Pedodontist desires associate full time. Contact Dr. Paul Schiff, 808 E. Manchester Blvd., Inglewood, Calif.

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CALIFORNIA—Pedodontist desires full time associate. Please give full details in first response. Address A.D.A. Box No. 913.

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CONNECTICUT—Prosthodontist needs associate to do general dentistry now being referred. Wonderful opportunity for young dentist to establish his own practice, new Ritter two-chair office, new building. No capital investment necessary. Address A.D.A. Box No. 983.

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DISTRICT OF COLUMBIA—Rotating dental internships starting July 1 each year. Dental intern program accredited by American Dental Association and Department of Dentistry accredited by American Hospital Association. Address Chairman, Resident-Intern Committee, Providence Hospital, 1150 Varnum St., N. E., Washington 17, D. C.

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DISTRICT OF COLUMBIA — Periodontist wanted. Full or part time for group practice in Washington, D. C. Prefer man with recent training and Board qualifications; write to Dental Director, Group Health Association, Inc., 1025 Vermont Ave., N. W., Washington 5, D. C.

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IOWA—Wanted, recent graduate or returning veteran, preferably with experience in surgery, to establish practice in northern Iowa community. Center of rich agriculture area; excellent medical facilities and service, but inadequate dental service. Cooperation of physicians and immediate practice assured. Near resort and fishing areas. Pheasant and deer hunting. Address A.D.A. Box No. 945.

KANSAS—Wanted dentist for a three man clinic and hospital group in south central Kansas. Salary plus commission with possible complete ownership of the equipment in the future. For details contact F. W. Schwerin, Achenbach Memorial Hospital, Hardtner, Kan.

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NEW YORK—Opportunity for dentist with medical group practice in upstate New York. Must have New York state license. This group offering comprehensive medical care, has three dentists, one vacancy at present. Semi-rural area 120 miles from New York City. Salary commensurate with training and experience. Excellent opportunity for dentist interested in integrated medical practice, preventive medicine and rural living. Address A.D.A. Box No. 986.

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NEW YORK—Dentist, lucrative Fifth Ave. general practice, wishes dentist, some private practice experience, for co-association. Planning retirement 5 to 7 years. Give detailed particulars. Address A.D.A. Box No. 987.

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NORTH DAKOTA—Excellent opportunity for experienced dentist to join medical group. One year of guaranteed salary, $8,000 plus percentage. Could be at least $13,000 net first year. No starvation period. (Other arrangements can be made.) Modern equipment. Two chairs, laboratory, etc. North Dakota license necessary. Start immediately. (Garrison Reservoir—200 miles of water—within two miles of town. Fishing, boating, etc.) Contact Martin Hochhauser, M. D., Garrison Clinic, Garrison, N. D.

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WASHINGTON—Foreign missionary work. Excellent opportunity for qualified men in all parts of the world. For details apply to The Missionary Dentist, 5543 25th Ave., N. E. Seattle 5.

OPPORTUNITIES WANTED

CALIFORNIA—1956 graduate desires association in pedodontic or better general practice. Military obligation completed in August. Address A.D.A. Box No. 988.

•

California licensed dentist wishes to purchase practice and equipment of busy, ethical general dentist or periodontist in southern California. Will associate for introductory period. Address A.D.A. Box No. 949.

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CALIFORNIA—Northwestern graduate 1956 with California license, completing military obligation July 1958, desires association with ethical general practitioner in southern California. Address Dr. David W. Bohn, 363 Leinbach Ave., Fort Ord, Calif.

•

CALIFORNIA—1955 graduate, licensed, married, age 26, completing military service in September, desires practice or association with ethical dentist in southern California. Address A.D.A. Box No. 948.

•

CONNECTICUT and New York licensed, wishes association or partnership or will buy lucrative practice, funds available; experienced, married, no military obligation; have equipment if needed. Address A.D.A. Box No. 989.

•

FLORIDA—1956 graduate, licensed, 27, family, desires association or purchase of established general practice. Military obligation complete in August. Available for interview in June. Address A.D.A. Box No. 952.

INDIANA—Licensed 1956 graduate completing military obligation July 1958 desires association with established general practitioner or group practice. Two years experience all phases dentistry at isolated military dental clinic. Address A.D.A. Box No. 990.

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Maryland licensed dentist, age 28, completing military service July 1958. Experienced in minor oral surgery and prosthetics. Wishes to purchase active practice vicinity of Washington or Baltimore, or will associate with opportunity to purchase. Address A.D.A. Box No. 991.

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New York licensed dentist completing military service this August desires to purchase or associate with an active private practice in metropolitan New York or vicinity. Have excellent experience in general dentistry. Address A.D.A. Box No. 992.

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New York-New Jersey practice wanted. Cash to invest. Must be lucrative. Two or more operating rooms. May consider association. Contact H. Nathanson, 175 Smith St., Perth Amboy, N. J.

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Ohio licensed dentist, 30, married, military obligation completed in early August 1958, desires employment in general practice either in Akron, Columbus or Toledo areas. Especially interested in children's dentistry. Address A.D.A. Box No. 993.

•

OREGON—Graduate licensed general practitioner arriving Oregon in August desires association with oral surgeon, prosthodontist, group practice or practice for sale. Northwestern Oregon. Write to Dr. Lewis B. Coover, Shelby, Ohio.

•

OREGON—Licensed dentist, age 26, married, presently completing military requirements, desires association in or around Portland area with general practitioner. Available August 1. Welcome interview. Address A.D.A. Box No. 994.

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TENNESSEE—Recent graduate, young, married, without military obligation desires new location or association leading to purchase of active dental practice. Address A.D.A. Box No. 995.

•

TENNESSEE—Recent graduate desires association or employment with dentist or hospital, full or part time, prefer Memphis area. Military obligations completed, have own equipment if needed. Address A.D.A. Box No. 996.

•

VIRGINIA—MCV '56, Virginia license, member O.K.U., married, military obligation complete September 1958, desires to buy or associate in general practice. Prefer Richmond area. Address A.D.A. Box No. 997.

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WASHINGTON—University of Washington graduate 1955, married, one year general practice, two years' military obligation completed July, desires association with ethical general practitioner. Address A.D.A. Box No. 998.

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Wanted—Orthodontic preceptorship under a Board Diplomate orthodontist. Age 26, married, military obligation fulfilled. One year general dentistry experience, National Boards and Pennsylvania license. Will take necessary state Boards. Address A.D.A. Box No. 963.

New location desired because of economic instability of community. Interested in an association with private practitioner or institutional practice. Experience includes 12 years general practice. Postgraduate work and National Boards. Address A.D.A. Box No. 999.

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Dentist desires position with industry, government or Civil Service outside continental U. S. Four years' foreign contract experience. Married, 41 years old, family, 16 years' private practice. Military obligations completed. Address A.D.A. Box No. 100.

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Desire position as sales representative. Will travel. Good health. Twelve years' experience in private practice. Address A.D.A. Box No. 101.

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Oral surgeon, 30, married, completing training May 1958. Three years' private practice, university graduate training and approved internship and residency including extensive general anesthesia. Military requirements completed. Desires association with individual or group or good location for establishing private practice. Address A.D.A. Box No. 966.

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Sober dentist with good background and experience desires employment of any kind, with commercial organization, school, hospital, clinic or government. Address A.D.A. Box No. 102.

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Periodontist, university trained, with excellent background desires part time association, metropolitan New York or western Connecticut, age 35. Address A.D.A. Box No. 103.

WANTED TO BUY

Old and used dental books, journals, prints. Leo L. Bruder, 1 DeKalb Ave., Dept. 21, Brooklyn, N. Y. Dealer in out-of-print dental literature.

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For sale. Cream white Cavitron, complete with connecting tubing and some tips. Will crate and ship express collect. $900. Write to Dr. George Snow, 2720 Capitol Ave., Sacramento, Calif.

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For sale. New cream white Cavitron ultrasonic unit, latest no-rust nylon paddle latest handpiece and accessories, not a scratch on unit, 55 brand new assorted points that have never been used. All for $1,000. Address A.D.A. Box No. 969.

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For sale. One new Cavitron machine, $750.00. Address A.D.A. Box No. 105.

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For sale. Cavitron dental unit, latest model, fuses on top, cream white, excellent condition, Newark, N. J. area, price $500.00. Address A.D.A. Box No. 106.

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For sale. Cavitron, cream white, large supply of tips and abrasives, $500, you pay shipping. Address A.D.A. Box No. 107.

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For sale. Cavitron dental unit, light green color, excellent condition. $975. Contact Dr. W. E. Bracker, 714 W. Sixth St., Medford, Ore.

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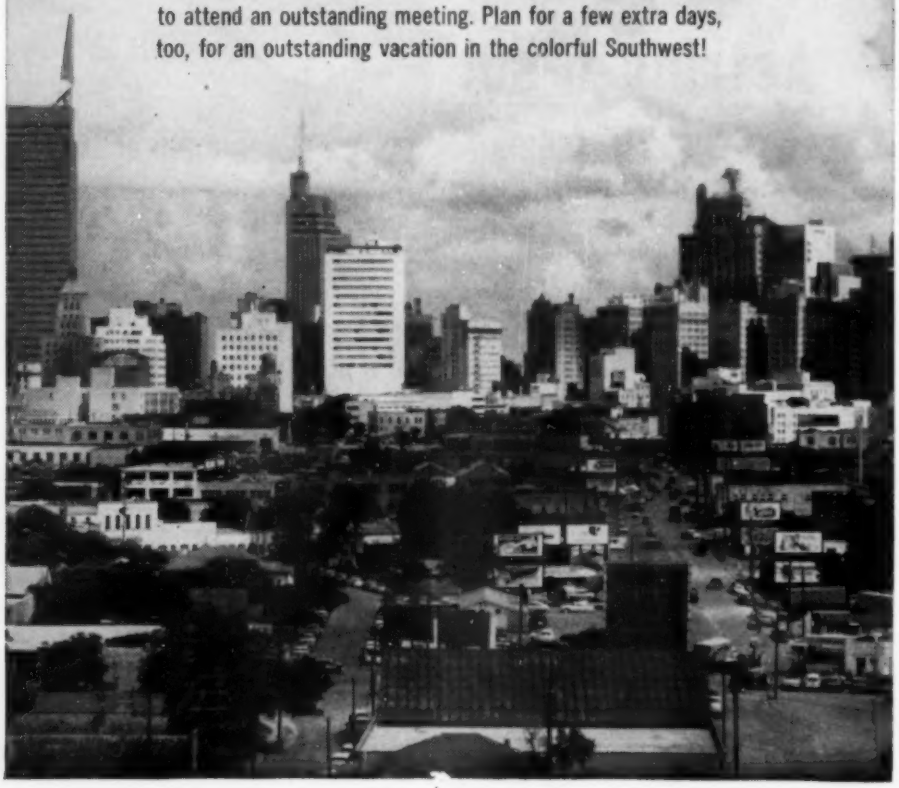

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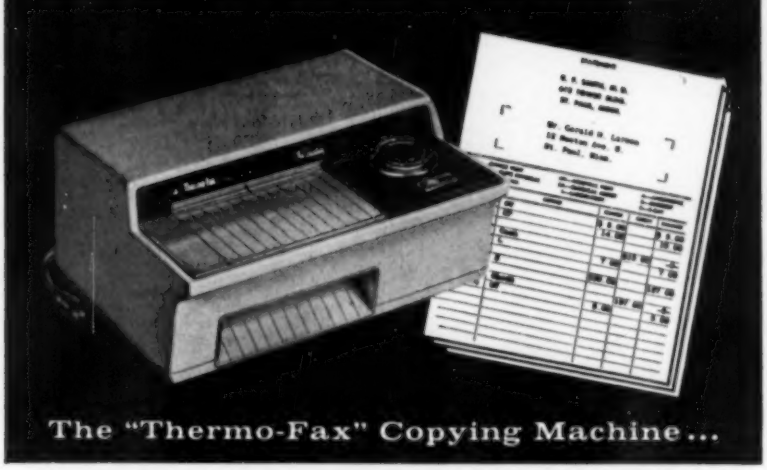

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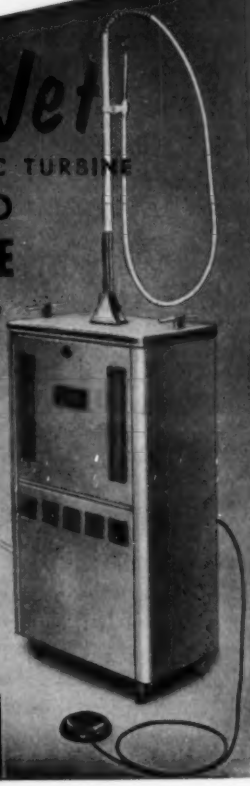

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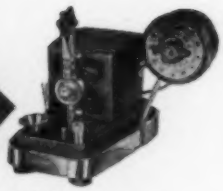

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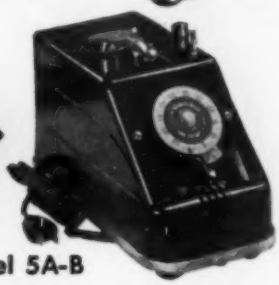

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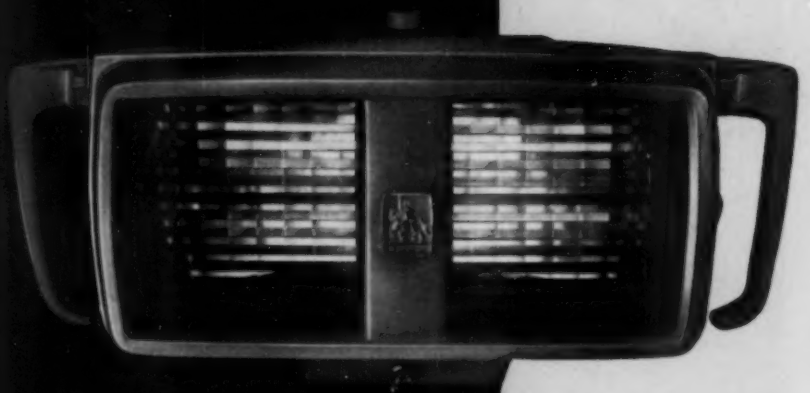

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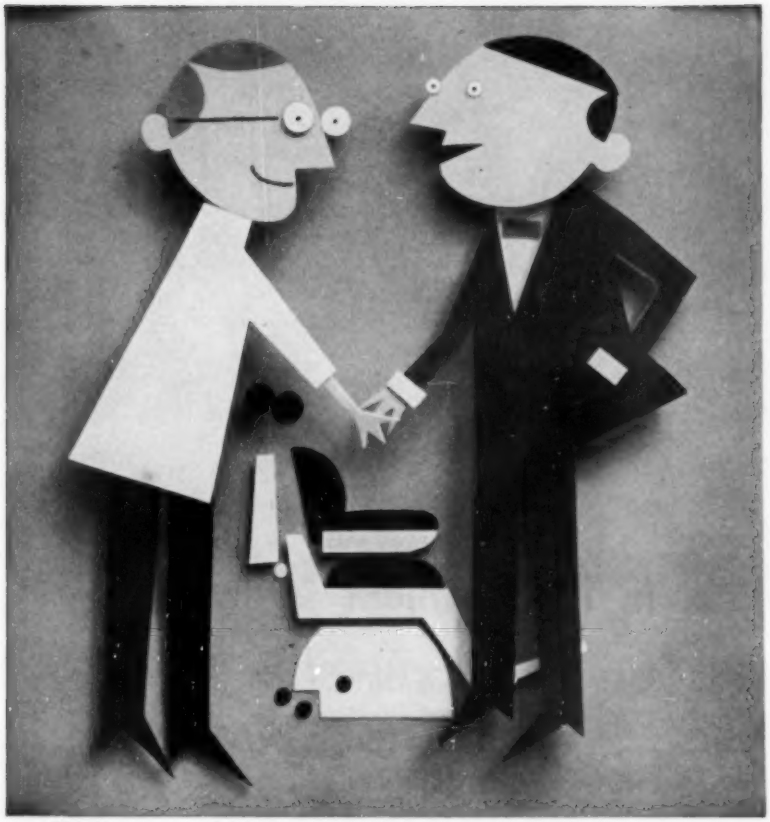

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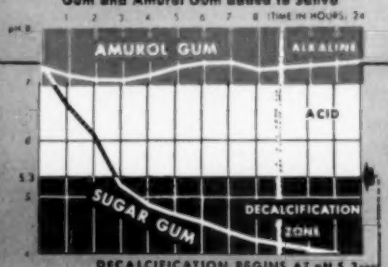

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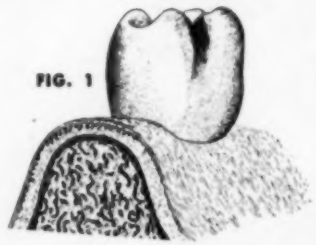
Pontic design and ridge relationship

FIG. 1



While, for esthetic reasons, the pontic must contact the ridge surface along its labial or buccal margin, it should not fit the ridge like a saddle as shown in Fig. 1. To do so creates a situation where self-cleansing action cannot take place.

FIG. 2

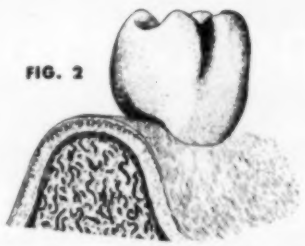
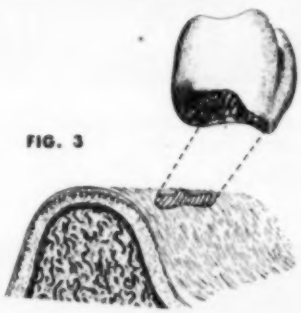


Fig. 2, on the other hand, shows the correct procedure. Here, buccally or labially, the pontic still contacts the ridge along the margin, but from this area toward the lingual the line of tissue contact is narrow, and the porcelain slopes away from the ridge tissues into the mesial and distal embrasures, giving the porcelain tip a definite mesio-distal convexity.

FIG. 3



The T-shaped area of tissue contact (shown in Fig. 3) permits a self-cleansing action between the pontic and the tissue, as the convexity of the porcelain tip allows food particles to be carried easily into the gingival embrasures of the pontic.

(Above prepared under the direction of George T. Cowger, D.D.S.)

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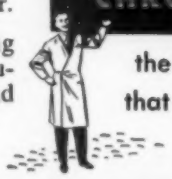

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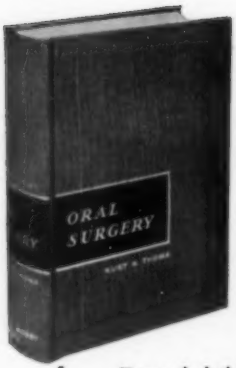

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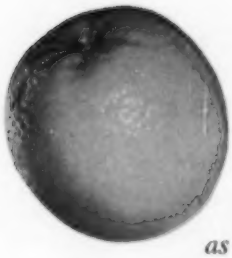

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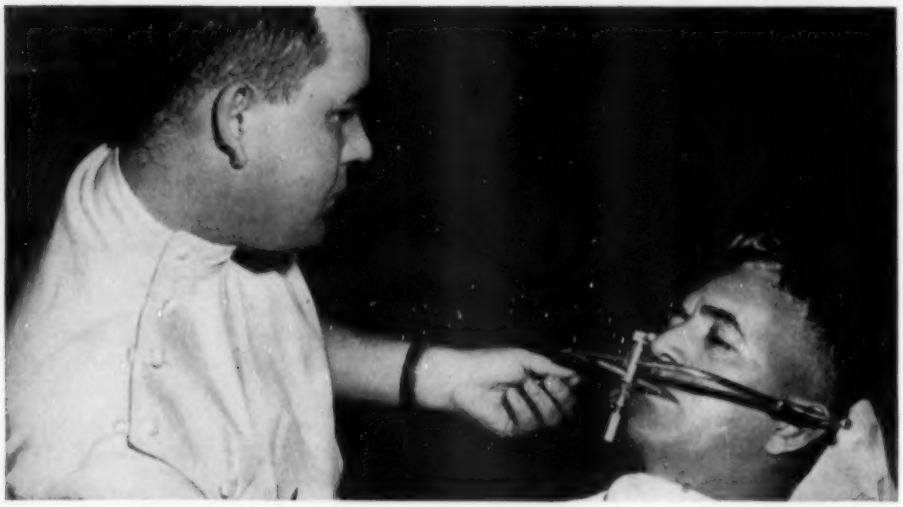

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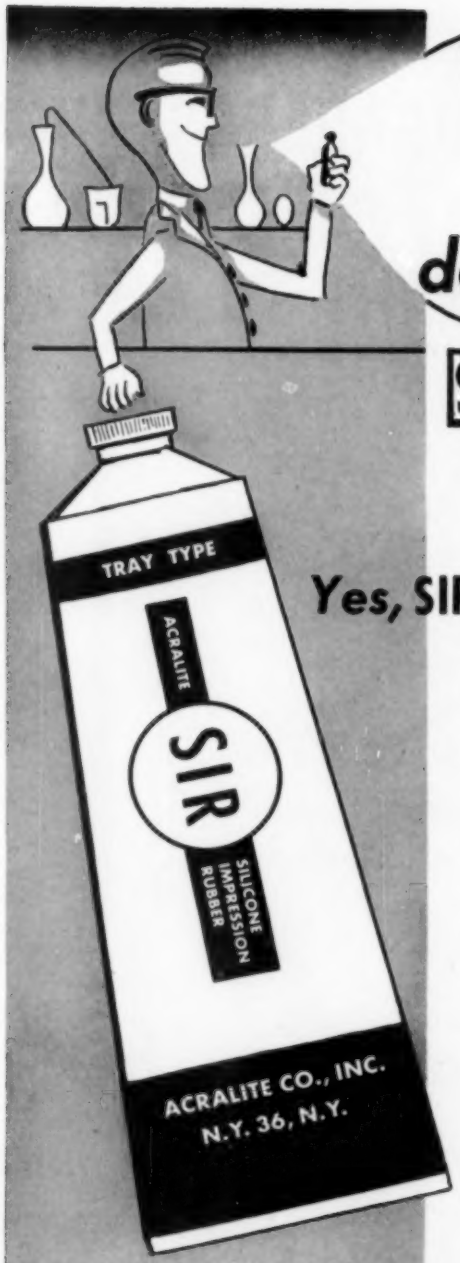

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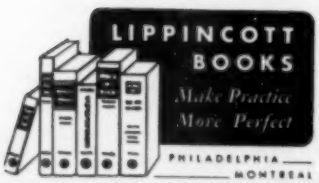

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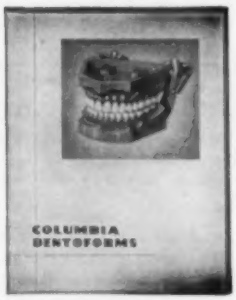

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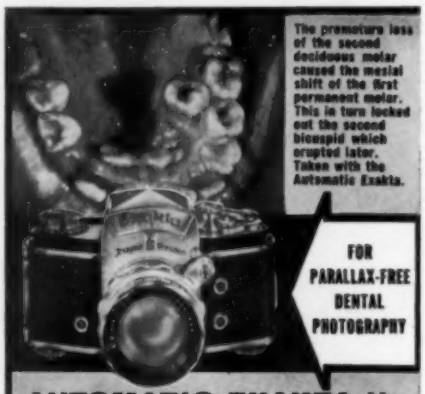

The premature loss of the second deciduous molar caused the mesial shift of the first permanent molar. This in turn locked out the second bicuspid which erupted later. Taken with the Automatic Exakta.

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Dentigerous Cyst

3 film sizes—3 aspects

Periapical—cyst involving a lower third molar.

Occlusal view—shows lateral and anteroposterior extensions of cystic lesion.

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Whatever the condition—one readily diagnosed from a single periapical examination or one requiring occlusal and extraoral films—the quality of each radiograph is vital. For it is upon the completeness and accuracy of the information that the treatment depends.

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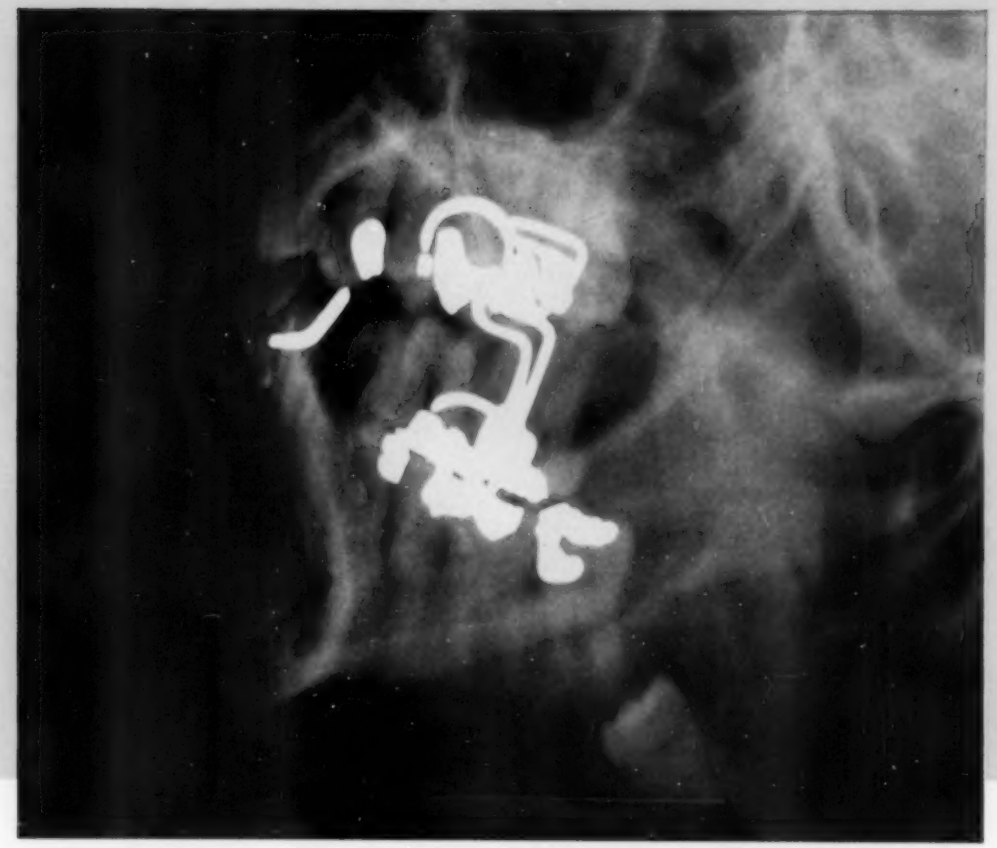

Extraoral view—shows complete outline of cyst and impacted tooth in relation to surrounding structures.

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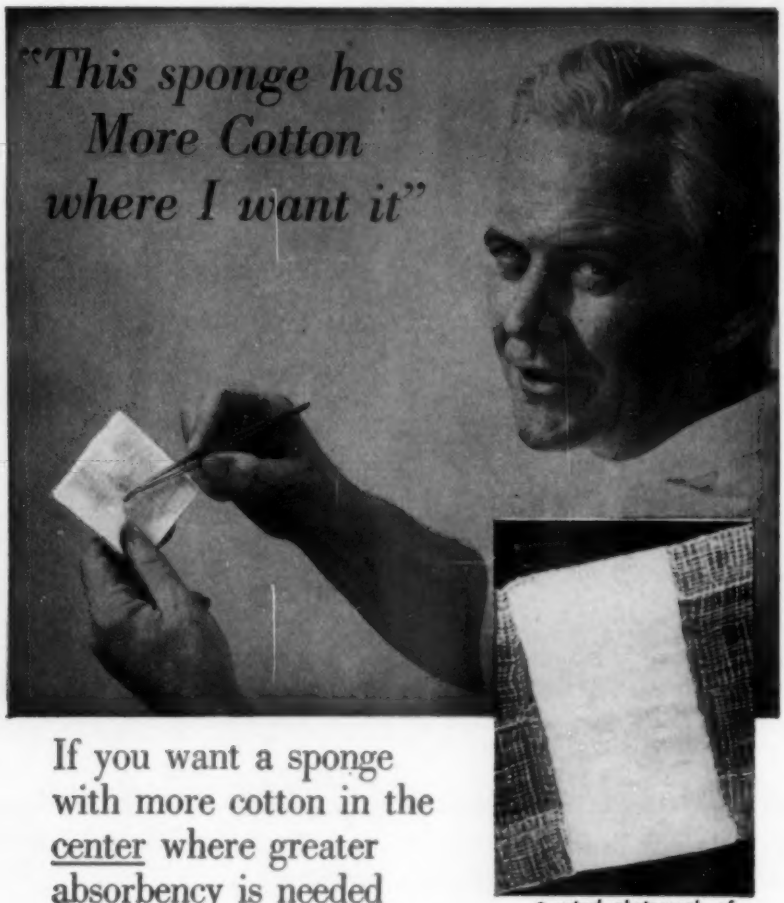

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• *actual photograph of cotton "ribbon" in opened Richmond sponge*

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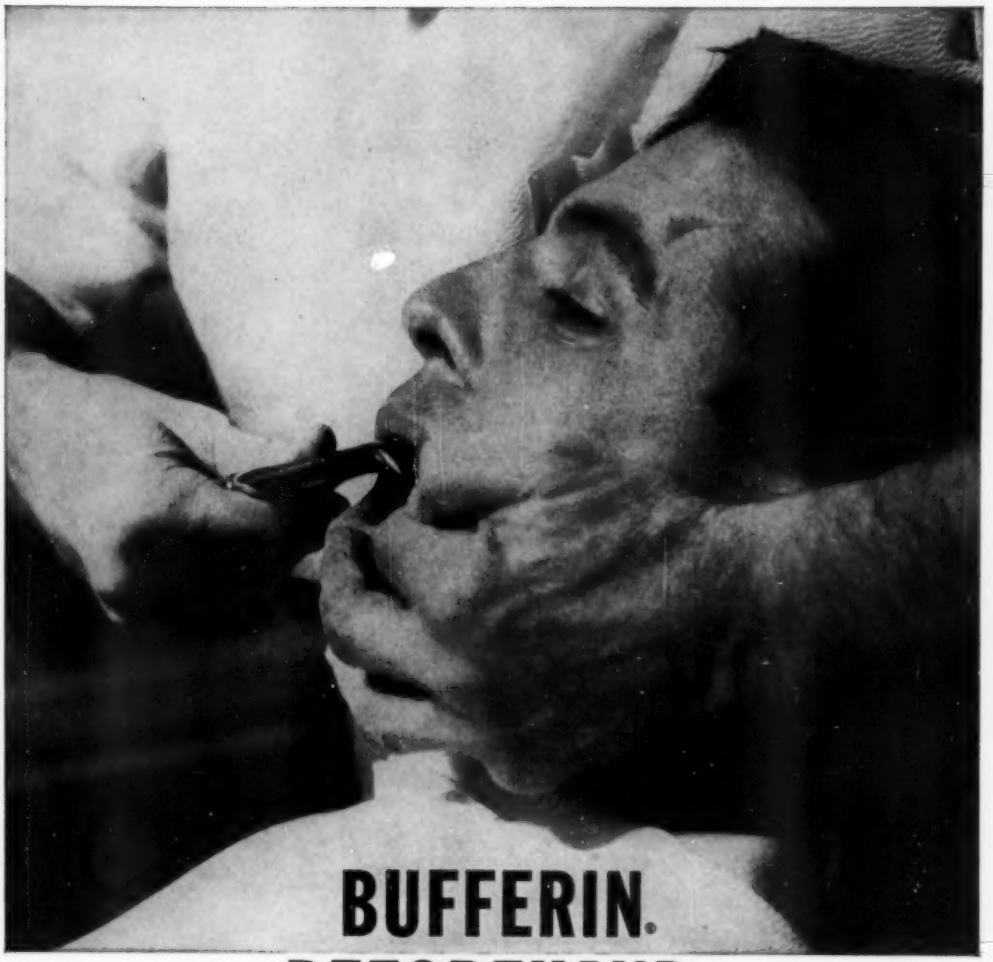

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